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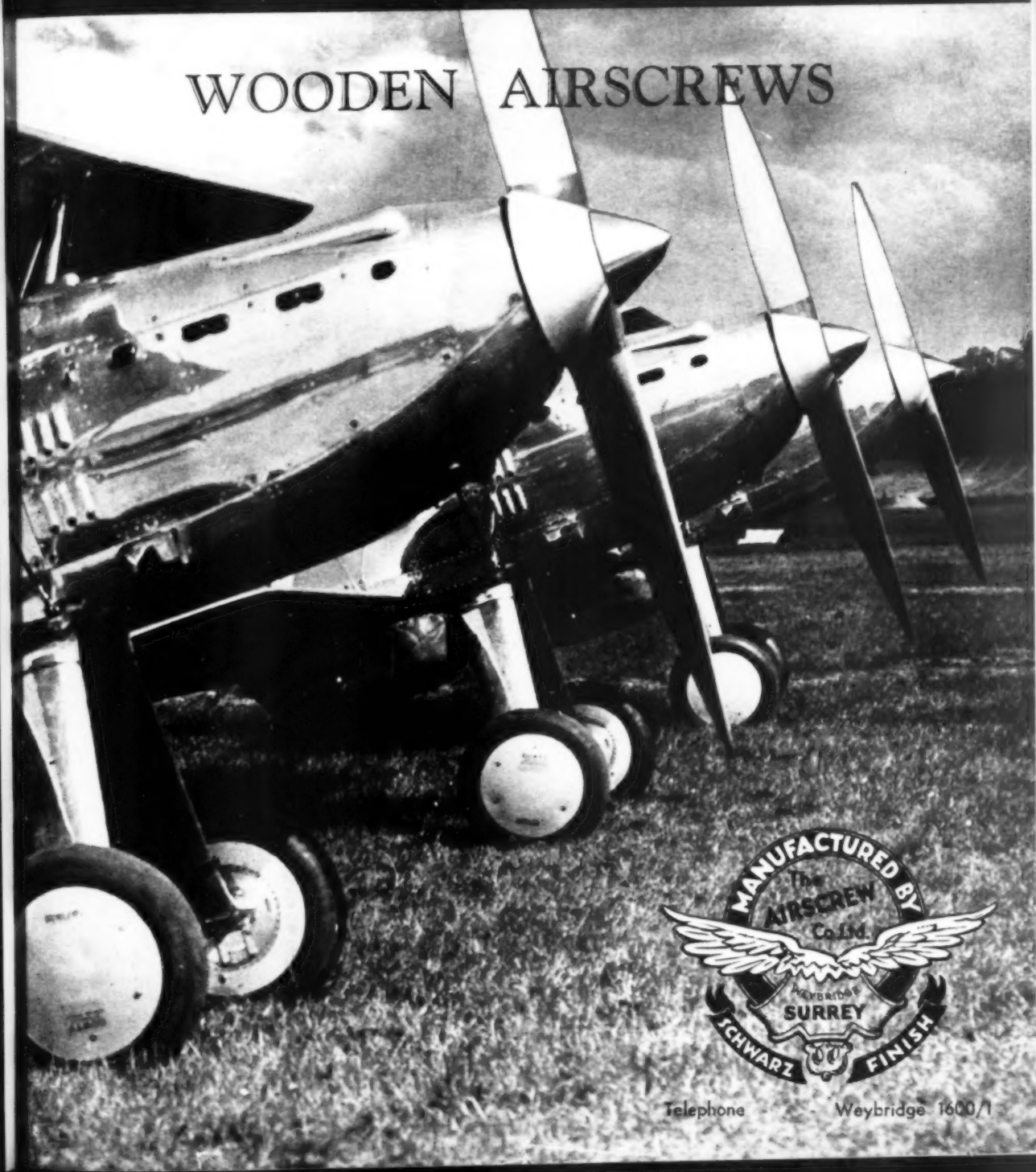
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The AIRCRAFT ENGINEER AND AIRSHIPS

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The Outlook

Frankensteins ?

THROUGHOUT the civilised world, in almost every sphere of activity, it seems to be the case that technical development has outstripped human adaptability. Production has become so efficient and scientific that manufactured articles, be they necessities or luxuries, are produced in quantities never even dreamt of twenty-five years ago. Distribution, on the other hand, lags sadly behind, and no one has yet been able to introduce a practicable method of rationalising it. The result is over-production of a commodity in one part of the world and a lack of that particular commodity in another.

In the aircraft world we suffer from very similar defects, although their manifestation is slightly different. The aerodynamic and structural design of aircraft have progressed enormously during the last few years; materials have become available which provide the designer with an opportunity to save another few ounces on his structure. New blended fuels make it possible to take from engines of a given volume far greater power than was available but a very few years ago. New low-drag cowlings, retractable undercarriages, slots and trailing-edge flaps, all these have endowed the modern aircraft with everyday performances which a decade ago were the prerogative of freak record machines flown by crack pilots.

But can one honestly say that other aspects of our great flying movement have kept pace? Has the ground organisation developed to a similar extent? And what of the human factor? Can it be claimed that it is the equal in efficiency of the wonderful mechanisms which it is given to handle? Does not almost every flying accident (and there have been far too many of them lately) bear witness to the fact that the answer to these questions must be a No?

There is little merit in hiding from ourselves the real facts. One of these is that the flying machine itself has outstripped our knowledge of how to handle it. The penalty of an error, even a comparatively small error, is greater now than it has ever been. This is mainly due to the higher speeds and the cleaner design of modern machines.

Weak Links

WHERE the links in the chain of safety are missing, or at least are weak, is perfectly well known. But they cannot be classified and catalogued in quite the same simple manner that aircraft specifications are. The amazing reliability of the modern aero engine has led to the operation of aircraft in all sorts of weather conditions. When anything goes wrong, it is not, in most cases, a matter of engine failure and forced landings. Rather is it due to some cause extraneous to the aircraft. There is still room for improvement in meteorological services, in direction-finding wireless, and, most of all, in solving the problems connected with the final stage of the blind approach so as to make the actual blind touch-down safe.

The prevention of ice formation is another problem not yet completely solved; or, if it is incapable of solution, we still lack 100 per cent. efficient means for dispersing the ice as soon as it forms. In certain conditions the ice may be so hard that it affects control surfaces, and although there are, we believe, no cases on record of such an occurrence having caused an accident, the possibility exists and should be guarded against.

It would be useless to ask for an international agreement, but perhaps common sense in all countries may prevail, and we may see a falling-off in the demand for higher and still higher performance until some of the other problems have been brought more into line. If, by mutual consent, all the countries could be persuaded to rest content with the performances now obtained, and the next year or two devoted to giving a little more attention to the other end of the speed scale, and to the ground organisation connected with it, the increased safety and regularity of air routes would bring its just reward in the form of increased traffic.

If the demand for still higher performance were to ease off, the aircraft designer could devote more thought to problems connected with take-off, approach and landing, and we should get aircraft which would not swing on take-off, would land more slowly, have a simpler approach technique, and touch down without bouncing.

Drat That Noise !

ONCE upon a time Wing Commander T. R. Cave-Brown-Cave was responsible for the installation of C.I. engines in the ill-fated airship R.101. Did he fit a silencer on them? We trow not. Mr. H. G. Strauss, M.P., bears the name of two gifted gentlemen who have been responsible for making a very great deal of loud though harmonious noise in the world. To his ears we should have thought that the musical drone of the aero engine ought to have come sweetly, full of suggestions of the melodies of his eminent namesakes. Yet these two, joined with two metaphorically spurred and belted knights (or were they baronets?), formed a deputation from the Anti-Noise League which approached the Under-Secretary for Air and asked him to wage war on aircraft noises over towns. Probably the Wing Commander told the League beforehand that the suggestion about silencers would be of no avail, but if so he was not regarded. Col. Muirhead made the inevitable reply.

Then the deputation pressed the Under-Secretary particularly to forbid all air advertising. Now there are certain forms of advertising which deface the beauty of the countryside, and to which every right-thinking person objects—unless they put money into his pocket, when, of course, the whole matter assumes a different aspect. But air advertising is not a form of publicity which all the virtuous people of the country are united in condemning. From the æsthetic point of view there is no evidence that the Anti-Noise League objects to it. Its members are concerned with noise, not appearance. Were Rima and Haig's alleged horse to fly over London, provided they did it in silence, the Anti-Noise League would have no *locus standi* for raising a protest. As for the addition to London's noises which is made by the occasional gyrations of a 504K, surely that is quite inconsiderable!

New Ideas for the Young Idea

"PILOT Officers are the Air Force," proudly remarked a Pilot Officer to *Flight* not long ago, and he was not far wrong. The recent increase in squadrons has resulted in so much promotion that Flight Lieutenants and Flying Officers are now almost as rare as the call of the cuckoo in February. One can almost imagine an excited civilian writing to *The Times* "I saw a Flying Officer to-day!"

One result of this is that very young and junior officers have not only to fly machines, but to undertake responsible work in the squadrons, such as the command of flights. The old idea, by which a squadron spent most of the spring on what was called "individual training" of the young officers who came to it from Cranwell, the Universities and the Flying Training Schools no longer holds good. A great deal of the instruction in squadron work, other than flying, is now carried out at the various centres of instruction.

It is interesting to learn from the report of the Commandant of the R.A.F. College (extracts from which are given on page 629) that Cranwell is taking this form of instruction very seriously. Air Vice-Marshal Baldwin has considerably reduced the time spent by Flight Cadets on engineering, as he considers it more profitable to teach Cadets maintenance of aircraft, the method of running a flight, and general knowledge of the workings of a squadron than to spend many hours explaining the complicated mechanism of the modern engine. Thus the young officers with permanent commissions who are sent out from Cranwell should be well fitted to assume responsibilities at an early stage of their Service career.

This development may be symptomatic of the way the R.A.F. wind is blowing. In the first days of the Royal Flying Corps it was decided, rather as an easy way out of a difficulty, that a pilot should almost universally be an officer. Now it is certainly thought less necessary, and the number of airmen pilots is on the increase. In both the older Services an officer is essentially one who commands, and is not primarily a fighting man. The Air Force seems to be slowly but steadily moving towards that conception of the division of duties.

Getting There

ANOTHER of Air Vice-Marshal Baldwin's new ideas will be very generally approved. He makes the Flight Cadets at Cranwell pay less attention to aerobatics and more to navigation. The country at large has been not a little perturbed by several recent instances of R.A.F. bombers losing their way, and sometimes coming to great grief. It was asked: If the R.A.F. cannot find its way through bad weather in time of peace, will it be able to do so in time of war?

The Commandant of Cranwell put it very neatly. "Whereas it is useful to be able to carry out aerobatics (and forced landings)," he says, "at the same time the design of modern aeroplanes does not lend itself to aerobatics (or forced landings), and the culmination of a Cadet's training should be his ability to find his way in all kinds of weather, and, having found his way, to be able to bomb accurately and use his guns in an efficient manner."

The dictum appears to apply to both bomber and fighter pilots. Air tacticians are doubtful whether the modern 300 (plus) m.p.h. fighter will be able to indulge much in aerobatics, while it is most essential that its gunnery should be accurate. Even in the Great War some of the best fighter pilots were not great stunters. Richthofen wrote contemptuously of the "loops and manœuvres of equal folly" in which Major Hawkes, V.C., indulged when he tried to break off their duel. Cranwell evidently means to turn out really useful officers at the cost of some ornamental trimmings.

Seasonable Thought

"CLAUS" is not among the names of the "C" class Empire boats of Imperial Airways. It is a pity that no one thought of that name, for it would have been most appropriate to have sent an aircraft thus christened to South Africa with the Christmas mail.

This year, for the first time, the messages of peace and good will to all the British lands in Africa are being carried for no more than it costs to send a Christmas letter from Acton to Ealing. No wonder the air mails have achieved a record in number of letters this season! Next year, no doubt, Australia will be enjoying the same blessings, and a much speedier delivery. A further swelling of the mail bags a year hence is a certainty.

No air route operators will ever make their fortune out of bumper loads of letters once a year. What they want is a perennial supply of hard-headed business missives: "*Re* your A/B/XY123Z of 17th ult., we have the honour to inform, etc." That is what they hanker for; not sentimental "old, old wishes" with robins and mistletoe in the corners. Sentiment, Sir, mere sentiment; no income in it!

Reindeer Power

BUT, after all, a large percentage of human effort is dictated by sentiment. People want to greet their friends at Christmas, especially those friends to whom they never think of writing from December to December. This instinct is one of the sweetening things in this hard world. The nephew who has gone to Australia to make his fortune leads a very different life and finds very different interests from those of his uncle in St. John's Wood. It is not easy to exchange letters regularly—and then (until quite lately) a letter took a whole month to get here from Melbourne. So correspondence flagged, and the two lost interest in each other, until Christmas approached, and then they both wanted to send warm messages. But, again, it is not easy to remember, or to arouse the Christmas spirit, a month before the appropriate time.

Now comes the flying Claus with his 3,000-odd reindeer power. That Christmas letter can be written with the holly lying ready to be hung above the pictures, and it will still arrive in time for Christmas Day. No income in Christmas mails? Perhaps not; but maybe there is something in them worth more than money.

DIARY OF FORTHCOMING EVENTS—PAGE 624

"FLIGHT" PHOTOGRAPHER'S CHRISTMAS SCOOP: Without doubt the greatest forward step in bomber construction, this amazing successor to the Handley Page Harrow combines modern aerodynamic practice with a "back to the land" formula which should make for maximum safety. *Flight's* chief photographer co-operated with Capt. J. H. Cordes in securing this unique aerial photograph for the *Handley Page Bulletin*, in which the novel craft is described by the "*Daily Excess* Air Scribe." The *Bulletin's* headlines are worth quoting: "Secret Wonderplane Revealed: First Details of New Miracle Skycar: Seats Two, Flies Backwards, Dances: 'Nose Crash Impossible' Inventor Avers."

Queen Anne Dead

THE Department of the Director-General of Civil Aviation does not share the views of the Irishman who asked the rhetorical question, "What has posterity done for us?" Its Annnal Reports become more and more ponderous, and appear later and later in the year. At the present rate the Report on civil aviation in 1937 will appear some time in the spring of 1939. The Report for 1936 appeared last Monday, and the historian of Anno Domini 2000 or so will doubtless find it extremely valuable. One of the first things he will exclaim will doubtless be: "Would you believe it? Even in those far-off days *Flight's* photographs of aircraft were evidently very good. Their aerial view of *Canopus*, used as a frontispiece, is excellent!"

The historian will also be intrigued to learn that in 1936 Imperial Airways' aircraft flew 4,560,718 miles and carried 4,803,427 ton-miles of traffic, but the present generation would much have preferred to know what were the figures for 1937.

Somewhat amusing to the cynic is the paragraph referring to the Maybury Committee and its report. "The report of the committee was accepted in principle by the Government, and consideration is being given to the steps necessary to implement the recommendations." When the report for 1937 comes to be published, that paragraph will still be correct, and probably in 1938 the Government will still be giving the matter its very earnest consideration. Isn't it beautiful to think how carefully each step is considered before it is taken? Even when one foot has been raised and moved forward, it is hastily withdrawn before anyone can definitely aver that the movement constituted a step. Surely it cannot be that action is deliberately delayed in order to prevent the Annual Report from being too out of date by the time it is published?

That even as long ago as 1936 the human factor was lagging behind the purely mechanical equipment is shown by the statement in the report that "rather more than 50 per cent. of the accidents were, in the opinion of the Chief Inspector, attributable solely to error of judgment or faulty airmanship."

Anyway, to those interested in ancient history, the Report is well worth the five shillings charged for it.

To readers at Home, in the Empire and in Foreign Countries, the Editor and Staff of "Flight" extend Christmas Greetings and Wishes for a Prosperous New Year, reciprocating the many kind wishes already received by Air, Land and Sea.

SCIENTIFICALLY

WITH the near-perfection, a decade ago, of two-way radio and gyroscopic instruments, the technique of transport flying merely entered the first stage of a transition period which has been a long one and which even now is not quite ended. While radio engineers, instrument experts and aircraft engine designers prepared for the changing conditions the entire psychological make-up of the pilots themselves had to be modified by custom and training. The intrepid aeronaut—or whatever the ordinary person cares to call this largely imaginary individual—had at the same time to be a methodically precise technician. Flying ability, as such, is now at a discount, and the ordinary pilot, whether Service or civil, must be re-trained to take a part in commercial work.

The change was inevitable it any progress were to be made in this transport flying business. Without it regularity could have been little better than 80 per cent. and the passengers, rocketed along, for instance, beneath a low cloud base, would always think twice before facing such an ordeal more than once. The die-hards can, until they are black in the face, talk scathingly about dangerous complications and electrical gadgetry—the transition was inevitable, and I doubt if there is one transport pilot in a hundred who would go back to the old methods, even if he were able to do so.

During the last few years, as an interested outsider, I have had a chance of riding for an hour or so in the control cabins of different machines with varying degrees of equipment, alongside British and Continental pilots with equally varying experience and opinions on navigational methods. In the comparatively early days of the transition period when the necessary equipment was only to be found at two or three German aerodromes, I stood behind a pilot who was demonstrating blind approaches. A little later, soon after Heston's system was installed, I tried it myself for forty minutes in Standard Radio's original test machine. Such minor experiences convinced me of the practicability of the ultra-short wave method of blind approach and of the necessity both for concentrated training in its use and for duplication and co-ordination in the equipment of all transport aeroplanes. It seemed then—and the need is now obvious—that the normal two-way radio, the approach receiver and the navigational instruments generally had to be planned and installed as a complete whole and not merely as a selection of different aids to the business of flying from here to there. In other words, it is necessary to organise for safety, reliability, and, at modern operating altitudes, for economy.

Recently, through the good offices of British Airways, I had an opportunity of spending a really useful length of time in the second pilot's seat of a machine as fully and carefully equipped as any in the world. Furthermore, the period included two non-stop runs of nearly five hundred miles, a distance which permits the modern transport machine to show its best paces. Only once during the entire trip, which was made in a Lockheed 10A or Electra, as it is better known, to Malmö and back, was the ground in view for more than a few minutes at the start of the climb and at the end of the approach, and there were long bouts of real blind-flying. Three blind, or semi-blind, approaches were made, and some not very serious ice-forming conditions provided a chance to study de-icing and anti-icing methods. The 10A was in charge of Cdr. C. N. Pelly, one of B.A.'s very senior pilots (he was with Hillmans before the merger), assisted by Mr. A. Woodall, the senior wireless operator of the company. A special radio compartment, immediately behind the control cabin, permits the B.A. Electras to carry, when necessary, two pilots as well as an operator; in the standard version the operator sits in the second pilot's seat.

Complete Equipment

Some time ago I spent forty minutes in the control cabin of one of the early and unmodified machines, and the control and instrument layout was comparatively familiar. Nevertheless, I was able, on this trip, to make a more careful study of power-plant and airscrew control at different altitudes, to see how the special rating and economy charts, developed by the company, were used, and to assist in the manipulation of such things as mixture and carburettor temperature controls.

This trip was particularly interesting, and was, in fact, made because the B.A. Electras are so very well equipped for operations in present-day conditions. Apart from normal Marconi two-way radio these machines are fitted, by the same firm, with a rotating loop which can be used either for obtaining bearings on different broadcasting stations, or for "homing" with the help of an indicator on the dashboard. Additionally, there is, of course, a Lorenz ultra-short wave receiving set, installed by Standard Telephones, for approach work in bad visibility. In some measure this

receiver provides a form of duplication in the radio equipment since, with the help of dead reckoning, it should still be possible to reach an airport even if the medium-wave equipment failed for some reason or other. Alternatively, failure of the short-wave receiver or of the beam transmitter on the ground would still leave the pilot with the usual facilities for a normal approach on successive bearings, or on his homing equipment.

Instrumentally, the Electra is equally well equipped. Nowadays one expects to see a full complement and here, disregarding the normal blind-flying and other instruments, including duplicated altimeters, there are air temperature and cylinder temperature gauges, carburettor temperature gauges with the necessary heater controls, and a Cambridge exhaust gas analyser for mixture adjustment. Additionally, the machines have effective protection from ice in the form of a Goodrich de-icer on the wings and tail surfaces.

The use of constant-speed airscrews and the fact that the machines operate at quite a considerable altitude for the best results to be obtained has necessitated the development of special power output and block-to-block speed charts. With their help the pilots are able to select the most efficient engine control settings for different altitudes and lengths of run, and to fly where possible in the most economical manner consistent with maintenance of schedule under different conditions. On the first comparatively long-distance section from Croydon to Hamburg, for instance, we had a following wind, and it was possible to cover the distance in a good deal less than the normal period of three hours while still using only 60 per cent. of the maximum available power. The approximate figures in this case were 1,900 r.p.m. with a manifold pressure of a little less than 65 cm. of mercury at an altitude of 2,100 metres (6,900ft.). On the chart which is published on page 620 it will be seen that these figures actually show an output of a little more than 250 b.h.p.—which is approximately 62 per cent. of the normal. The dotted line on this chart shows how it is read while using these figures. In our case the airspeed indication was 240 km./h. (150 m.p.h.), and this, again corrected for height, air temperature, and position error, would be approximately 270 km./h. (167 m.p.h.).

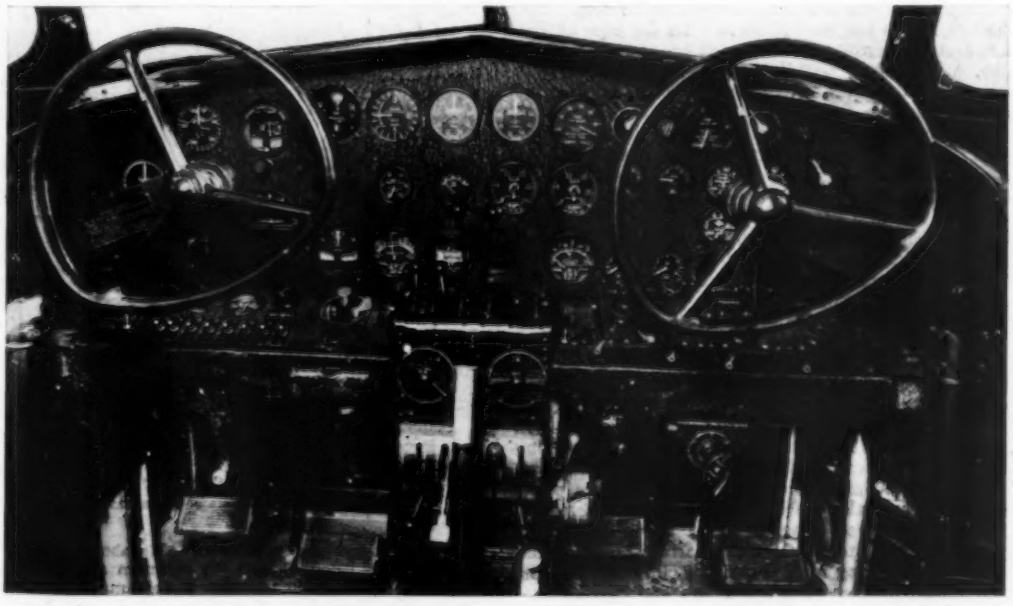
We had been told by the meteorological people that the upper winds would be comparatively light, but as the ground speed over the 765 km. run to Hamburg worked out at 306 km./h. (190 m.p.h.), it seemed that this upper wind must have been a good deal stronger than was anticipated. One of the difficulties in high altitude work is that the met. experts are as yet unable to estimate upper-wind speeds with any great accuracy. Dead-reckoning navigation, therefore, is almost impossible, and it is necessary to obtain a radio position after, say, an hour's flying in order to check the initial estimations.

The necessity for maintaining schedule as economically as possible is obvious, and the special block-to-block speed and optimum altitude chart has been developed to assist pilots in this matter. The chart is also shown on page 620, and should be self-explanatory. The curves at the top give the schedule speeds (including the necessary manœuvring time) with different powers and for different distances in still air. Those at the bottom show the optimum altitudes for flight over similar distances and taking 200, 250, or 300 b.h.p. out of each of the Wasp Juniors.

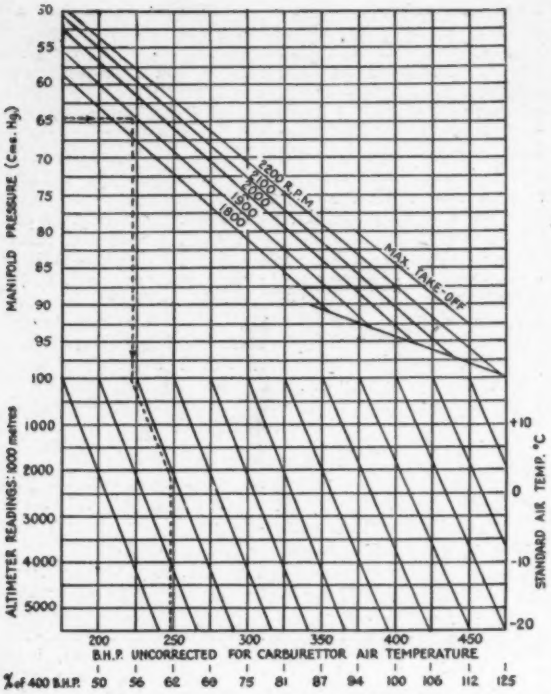
Yo SWEDEN

A Study of Modern Methods of Transport : Flying on the British Airways' Run to Hamburg and Malmö : The Use of Power and Altitude Charts for Long-range Efficiency : Blind-approach Technique

by H. A. TAYLOR.



Inside the control cabin of one of British Airways Electras. The central throttle bank carries c.s. airscrew controls on the left and mixture controls on the right, while below are the undercarriage, flap, and carburettor-heater controls. Among the less usual instruments may be seen the mixture analyser (behind the throttles), the cylinder-head and outside air temperature gauges, and the blind approach indicator. The wireless panel and controls on the right have now been removed, since the operator has his own premises aft of the pilot's cabin.



One of the power output charts for Pratt and Whitney S.B. Junior engines used by the Electra pilots. The dotted line indicates the method of its use, and the particular figures concerned are : 1,900 r.p.m. with a manifold pressure of 64 cms. of mercury at an altitude of 2,100 metres. The power output for each engine is therefore a little less than 250 b.h.p.—or 61 per cent. of normal full power. Other charts, on somewhat similar lines, have been developed for the Junkers Ju. 52 machines which are used on the Berlin night mail run.

It is obviously necessary to lean down the mixture as far as is permissible when cruising above a basic altitude of 1,500 metres, below which the mixture control may justifiably be left in the full rich position. In the case of the Electra the airscrews are of the constant-speed type, which, of course, means that, within certain limits set by the governor controls, the airscrews change pitch automatically in order to keep the engine revolutions at a pre-set figure. Consequently it is not possible to adjust the mixture in the ordinary way by watching for the first slight drop in revolutions during the process, and it is necessary to use some form of analyser if the carburettors are not of the automatic mixture control type.

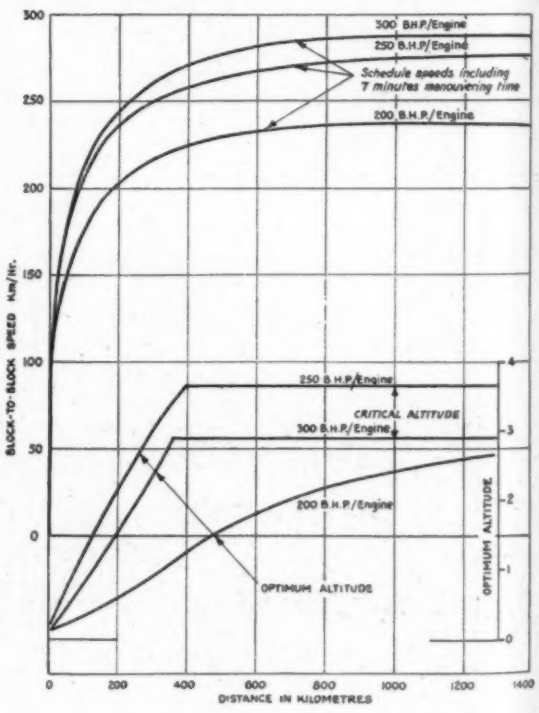
In the B.A. Electras the necessary check takes the form of a Cambridge exhaust-gas analyser, in which two needles, one for each engine, move transversely across a dial between the full rich and dangerously weak graduation. The constant-speed airscrews may be locked in fine or coarse pitch, and if, by any chance, the analyser is suspected of failing to do its work, it is possible to lock the airscrews in coarse pitch and to adjust the mixture in the ordinary way. The cylinder-head temperature gauge, which may be switched over to read either engine, will also help to tell the pilot if there is any sign of overheating due to an excessively weak mixture. However, these Cambridge analysers are of considerable value and the pilots are accustomed to make the best use of them. Certainly during ten hours or so I never found any difficulty in adjusting the control to produce the correct reading, and at no time, even during long periods of climbing, did the head temperatures exceed the customary 160 degrees C.

Before going on to describe the navigational sequence during this trip it might be well to make one or two comments and criticisms which apply to nearly all transport aeroplanes. The first is that in heavy rain, snow, or sleet it is not possible for the pilot to see out as well as he should be able to, and it was necessary in this case for him to open one of the side windows and to do as well as he could with the little rectangle of view so made available. Somebody ought to develop a centrifugal windscreen wiper or a guard-cum-heater so that one of the main panels, or part of it, remains quite clear in all possible conditions.

The second is that the static problem with all metal aeroplanes is quite a serious one, and during the final approach into Croydon in the dark and in heavy rain radio transmission and reception was affected. Whether or not it would have been possible to use the short-wave receiver I am not in a position to say ; as it happened, the visibility was quite good. Work on this static problem is going on both here and in America, and it should be solved in due course by means of special aerial design or in some other way. In the case of the Electra I could see no possible reason, either, why the carburettor-heater controls should not be automatic ; during the climb and descent their adjustment involves the pilot in a certain amount of extra work.

A *Psychological Point*

Lastly, it is possibly a bad thing to install an altimeter in the passengers' cabin—though such an instrument is both interesting and educative to more experienced air travellers. If the occupants do not know that they are flying at ten or eleven thousand feet they will probably feel or imagine no ill-effects. I remember once being transported at 4,500 metres (14,760ft.). Two of the passengers were of the enquiring mind, and the stewardess told them that they were at 4,500 *feet*. They were perfectly happy. A little later a more knowledgeable passenger obtained a momentary view of the ground and remarked that we were flying at twelve thousand feet or more ; immediately one of the two original enquirers turned green. Furthermore, a blind approach at 100 metres looks like nothing at all



The block-to-block average speeds (above) for different distances and powers, and the optimum altitude runs over these distances and at these powers may be read off at once with the help of this chart. At present, British Airways' longest non-stop run is 765 kms. from Croydon to Hamburg, though the trip from Croydon to Copenhagen or return is sometimes done without a halt if the Hamburg weather is impossible. A further chart is carried to correct indicated air speeds for position error and height.

on a normal altimeter—and that is worrying. The cabin altimeter may be unchecked and it may even show less than zero during such an approach—which is even more worrying.

We left Croydon under a 200-metre 10/10 ceiling through which we climbed straight up to operating height. The weather reports gave rather similar conditions over the entire run to Hamburg and Malmö, but it was interesting, when approaching Amsterdam, to learn that the cloud height there was down to 50 metres and the visibility was a kilometre or so. We were flying in bright sunshine at a little more than 2,400 metres, and as our first stop was Hamburg the Amsterdam weather was no concern of ours. However, Mr. Woodall, the operator, learned that the A.B.A. D.C.3 was hanging about waiting for his turn to land—which was Number Three—and Mr. Pelly gave Schiphol the upper air temperature as 0° C. at 2,500 m. for the benefit of the Swedish pilot and of any others who were about to proceed on their way in the sub-stratosphere. Incidentally, Schiphol has, and has had for some years, its own medium-wave approach beams and markers; these beams lie at 230° to 50° M. respectively.

Simplified Navigation

Until this moment Mr. Pelly had been flying on a dead reckoning course, resetting the directional gyro at intervals, and at this point it was thought advisable to obtain a position. By way of an initial check, he obtained a QDM (magnetic course to steer) from Amsterdam. This was 72° and suggested fairly obviously that we were a little south of our track. A little later he obtained QTEs (true bearings) from Schiphol and Twente. These were 66° and 6° respectively, and when they were laid off on a chart the intersection point proved to be exactly on the correct track. For this purpose the British Airways pilots use 1 in 1,000,000-scale maps with press studs, surrounded by bearing graduations, located at each radio station; small measured celluloid rules may be clipped to the studs so that positions and distances may be read off on sight without the necessity for pencil work.

At Fuhlsbüttel (Hamburg) the visibility was fair with 10/10 cloud at 350 metres, so there was no real need to use the blind approach system. Nevertheless, practice is always a good thing, and we asked the control officer there to switch on the transmitter, though we were told that only the approach from the north-west must be used. The beam QDMs are 240° and 60°, and after obtaining the barometric pressure in order to adjust the millibar scales on the altimeters we made an initial approach at a fair altitude on the S.W. side before turning and making a practice approach according to instructions. The 765 km. had been covered in exactly 2½ hours—an average of 306 km./hr. (190 m.p.h.)—and I had some time to wait in the pleasantly furnished airport "lock-up" before going aboard again. Mr. H. R. L. Smith, who was previously with B.C.A. and B.W.C.A., looks after the British Airways' interests at Hamburg, and it was interesting to see current copies of the British aeronautical journals as almost the sole reading matter to be found in the waiting-room.

All Experience

Rather less encouraging was the weather report from Kastrup (Copenhagen), which gave a cloud base of 100 metres; later to descend to 70 metres. While even the second figure may seem quite high as bad weather ceilings go, it is worth remembering that 40 metres is, in fact, the minimum cloud height at present deemed by British Airways to be quite safe for mail and freight approach work. It should be noted here, as a matter of interest, too, that the senior pilots of this company fly for three weeks on the daylight services and for one week on the night mail run to Berlin, so they obtain plenty of experience.

So far there had been little if any ice formation, though, as a safety measure, the pitot-head heater was permanently switched on and the gyroscopic instruments were, of course, being run off the engine-driven vacuum pump; in fact, the venturi is only there in case of any possible trouble with this pump. On the way to Kastrup an inversion caused the temperature at 1,500 metres to be 6° C., while at ground level it was only 3° C., a fact which we duly reported to Hamburg. After a quarter of an hour's flying a QTE was obtained from Hamburg which showed us to be a little to the west of our track, and we were advised that the Electra on the homeward run was flying at 2,000 metres. Consequently we were told to fly at 1,000 metres.

A QDM from Kastrup showed that we were still a little west of our track, and Mr. Pelly changed course in order to strike the blind approach beam on the QDM 308° side, permitting a very safe approach from the seaward side of Kastrup, which, incidentally, is also a seaplane base. Just as we had come to the conclusion that the short-wave transmitter was not switched on and were consequently coming in on a succession of QDMs—337°, 338°, 337°, 335°, and so on—we heard the distinctive dots of the beam and slowly closed in to the constant note, crossing the airport boundary less than a minute later. On the seaward side no outer marker beacon, of course, can be installed, and the first indication of the nearness of the airport was the call-to-action pipping of the inner marker. British Airways—and, unofficially, British civil aviation in general—are looked after in Scandinavia by Mr. Arnold Damm, whose brother is, as a matter of fact, the assistant director of D.D.L., the Danish transport company.

The rest of the journey across the water into Sweden is a matter of five or ten minutes' flying.

The weather on the following morning was, if anything, even less pleasant, and the top of one of Malmö's church steeples was very firmly in the clouds. Visibility was of the 1 km. order. We climbed straight up through the comparatively shallow cloud layer and, after passing a small formation of quails (or something similar) flying above the clouds in the opposite direction, we got immediately on to the approach beam and came straight in.

Ice Removal

Visibility at Hamburg, originally given as 1,000 metres, slowly deteriorated to 600 with a cloud base at 100. Obviously, the approach system was going to prove invaluable. Again the presence of another Electra caused instructions to be given to us to fly at a certain definite height, and this time the particular height was right in the middle of the cloud layer with the air temperature gauge showing 0° C. Some ice formation could be expected, and, as an onlooker, I hoped that it might be heavy enough to make things interesting. The layer on the leading edge, as it happened, was not more than a quarter of an inch thick, but it was enough to provide an excuse for setting the Goodrich pulsator in action, and for moving the knurled knob which controls the supply of glycerine from the spinners to protect the airscrew blades. The ice broke away to order, and the only slight unpleasantness concerned the unsymmetrical thawing on the fixed aerial support when, later, we flew into warmer air; the airflow against the still undislodged portions of ice caused a slight vibration of the control cabin—which would certainly not have been felt in the passenger compartment.

Once again the operator obtained the Hamburg barometric pressure for altimeter adjustment, and asked the control officer there to switch on the Lorenz transmitters. This time we were permitted to come straight in on the QDM 240°, and our landing turn was Number One. Mr. Pelly lost height according to plan while waiting for the first sign of the beam signals. Normally, in really bad conditions, the approach procedure is to fly to the aerodrome on a succession of QDMs until the "motors over" signal is received, and then to fly off down the beam for a certain definite period of time before turning and making the final approach, using beam indications largely as a check on a pre-computed directional gyro reading and using a dashboard stop-watch as a check on the distance covered between the outer and inner marker beacons.

On the QDM 240° side at Hamburg the main beam appears to be completely cut off for a matter of a quarter of a mile because of the effect of a certain factory with a large expanse of tin roof, and on our first approach this artificial "cone of silence" was naturally taken as an indication of the fact that we had somehow left the correct line. We turned to the left through 360°, picked up

the signals and again got on to the constant-note path. Once more the signals faded, and the operator was busy obtaining QDMs for the pilot when the constant note reappeared with comforting loudness: Mr. Pelly had naturally found it necessary to remove his headphones in order to be in immediate aural contact with the operator as the necessary bearings were sung out. Immediately afterwards the outer marker signals came through, and the landing was made straight off the approach on to an aerodrome sodden with the effect of alternate freezing and thawing.

As it happens, the white take-off line at Hamburg is, starting from the tarmac end, almost directly on the course to Croydon, and—after a Ju.52 had duly come in, a K.L.M. D.C.2 gone off to Copenhagen, and the daily substratospheric meteorological machine had left on its explorations—we took off down the line. The weather on the route was to be considered as extremely good for the time of the year, and, as dusk fell, the ground was actually in view for more than ten minutes in the vicinity of Amsterdam. Interestingly enough, the difference between the respective barometric pressures at Hamburg and Croydon—996 and 979 millibars—was equivalent to one of 600 feet in height. Hence the vital necessity of obtaining such information, and of resetting the altimeter accordingly.

The conditions at Croydon were given as comparatively good with visibility of rather more than a mile, though it was raining. Practically the only serious radio bearing taken during this final run was one from Amsterdam in order to fix our position before climbing above a higher cloud level. Over the Thames Estuary in the dark it was almost possible to fly by the occasionally seen landmarks, but towards London the cloud base descended and Croydon was finally reached in heavy downpour of sleet and rain. The new flush strip lighting in three different colours down the blind approach run at the airport must be of tremendous assistance to pilots landing in bad visibility, or in conditions such as were experienced by us, when it was almost impossible to gauge landing height with the help of floodlight illumination alone. Presently, if the tricycle undercarriage is not a sufficient aid by itself, some method may be evolved by which landing height may be more easily judged in thick weather, snow, or heavy rain. As I said to begin with, the transition period has not yet ended.

Hobson's Progress

AT the annual general meeting of H. M. Hobson (Aircraft and Motor) Components, Ltd., held in London last week, the chairman, Maj. T. P. Searight, said that it was with considerable pleasure that he was able to report a year of continued progress. The net profit was £67,855, compared with £35,676 for the 15 months ended September 30, 1936.

A final dividend of 10 per cent. was recommended, which, with the 5 per cent. interim dividend and a bonus of 2½ per cent., made 17½ per cent. for the year.

Maj. Searight said that increased production and technical development facilities were required, and with that end in view they had purchased a subsidiary factory and also arranged for increased foundry accommodation in the Wolverhampton district; both were situated conveniently close to their present Accuracy Works.

The company, acting for and on behalf of the Secretary of State for Air, had been entrusted with the equipment and management of the Carburettor Shadow Factory at Woodstock Mill, Oldham, Lancashire.

The chairman announced a staff pensions scheme.

Some Recent Books

Transaer. A Handbook of International Air Transport, 1937. Rm. 18, Richard Pflaum, Verlag, Munich.

NO handbook dealing with such a fluctuating and expanding industry as world air transport can ever be completely up to date, but in *Transaer* the editors, Messrs. Fischer Poturzyn, H. Orlovius and August Dresel, have managed to produce something which is likely to be of definite value as a book of reference

To many of us the majority of the basic and general facts about the better-known air transport companies are familiar, but it is always difficult to lay our hands at once on material in which details, and particularly historical details, are given. Furthermore, there are many companies operating in the more remote corners of the world of whom information can only be obtained with the greatest difficulty.

The title *Transaer* may sound strange to the English reader. It was, in fact, chosen simply because the word is likely to be understood in the greatest possible number of countries.

Interavia ABC 1937/1938.

Thirty shillings' worth of highly concentrated information, this directory is being distributed throughout the Empire by Airco, Ltd., of Eagle House, 109, Jermyn Street, London, S.W.1. To quote the publishers, it is "based on documentation up to June 30, 1937." There is a revised system of indexing, and, altogether, this impressive work should be of even greater value than its predecessor. In addition to the mass of information on international aviation activities there are ninety-three maps.

"Pilots Only," by Ann Courtenay Edmonds, 2s. 6d., H. W. Robinson and Son, Bedford.

Half-a-crown's worth of thumb-nail sketches and funny stories (some of them quite funny) about flying clubs and the people who inhabit them, produced in an ingenuous style that cheerfully disregards the laws of both perspective and punctuation.

World's Finest Photographs

ALL photographic enthusiasts who take their hobby (or perhaps profession) seriously will be interested in *Photograms of the Year, 1938*. This, the annual review of the world's finest photographic work, contains nearly 100 reproductions on art paper. There is also a directory of over 400 British photographic societies. *Photograms*, which is published by Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1, is obtainable from booksellers at 5s. (paper) or 7s. 6d. (cloth bound).

Warmth en Masse

WHAT is claimed to be one of the biggest orders ever placed for electrically heated flying kit has been placed with D. Lewis, Ltd., of 124, Great Portland Street, the well-known aviation clothing specialists. The order runs into some thousands of pounds, and the kits comprise suits, boots and gloves.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

THE Russian Government has bought the Lockheed Electra (two Wasps) in which Dick Merrill and Jack Lambie made their double Atlantic crossing last summer.

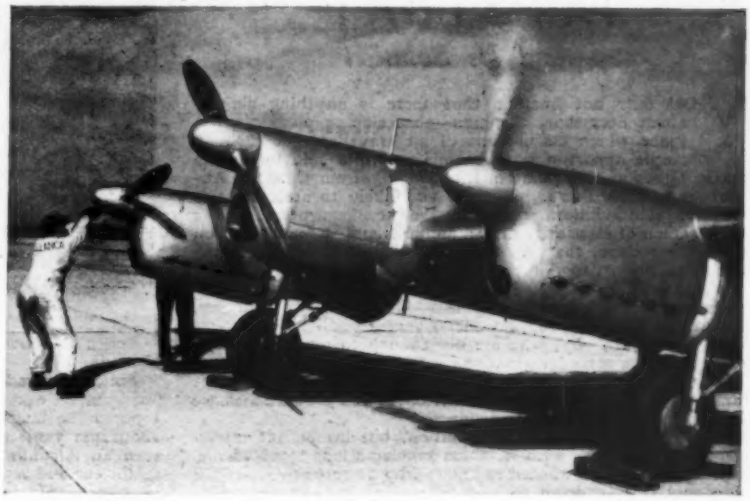
Since August 9 this year, when the export of military aircraft was first made subject to the requirements of a specific licence, 19 licences have been issued for the export of aircraft with engines of more than 500 h.p. each.

Symbolising the trend towards the use of more powerful engines, a new test-house just completed for the Pratt and Whitney concern can handle units of 3,000 h.p.—about twice as big as the largest present-day production types. Tests can be made simultaneously on engines and airscrews.

A special Christmas holiday exhibition at the Royal United Service Institution Museum, Whitehall, portrays, with a diorama and models, the development of Imperial air communications. Enlargements of *Flight* photographs are also included. Another special exhibition at the museum deals with air raid precautions.

Fokker has been granted the European representation for the Consolidated Aircraft Corporation, makers of the famous PBY flying boats, more than 200 of which have been supplied to the U.S. Navy. With two Twin Wasp engines the PBY does 186 m.p.h., and can remain aloft for 34 hours.

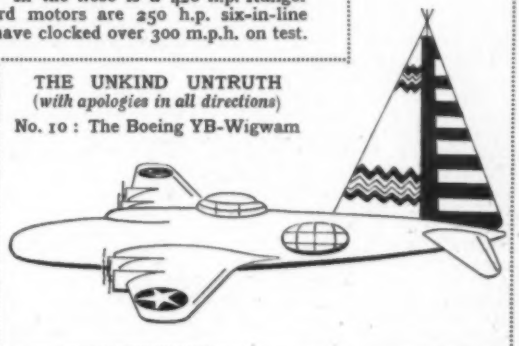
The granting of the agency was probably influenced by the fact that Fokker made such a big success of the sale of Douglases in Europe, more than 70 having been sold. The news is all the more interesting in view of the recent flight by fourteen PBYs from San Diego to Cristobal (3,008 miles) in 22 hours.

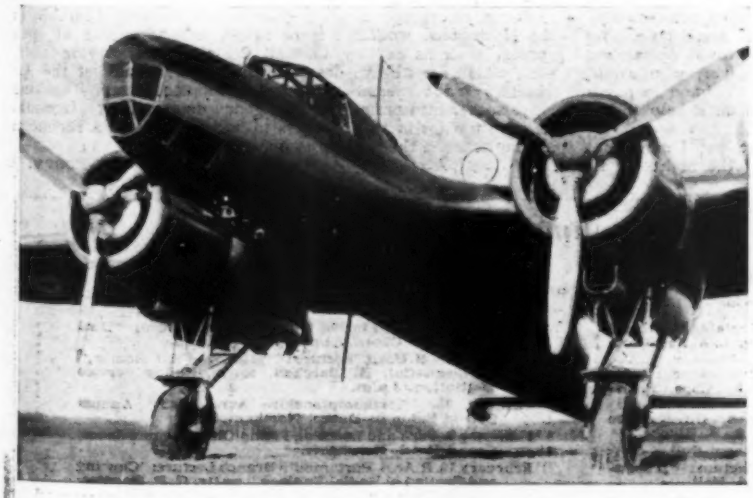


ASSORTED POWER: The special Bellanca monoplane in which Capt. Papana, the Rumanian pilot, intends to fly from New York to Bucharest. In the nose is a 420 h.p. Ranger vee-twelve; the outboard motors are 250 h.p. six-in-line Menascos. It is said to have clocked over 300 m.p.h. on test.

In consequence of the election defeat of the former Minister for Defence, Sir Archdale Parkhill, it is expected that the Commonwealth Aircraft Corporation will build aeroplanes for the R.A.A.F. not only of the American NA types, but also of various British types. Three firms mentioned are Fairey, Bristol and Hawker.

THE UNKIND UNTRUTH
(with apologies in all directions)
No. 10: The Boeing YB-Wigwam





FRANCO-GERMAN: This Dornier Do. 17 bomber, one of twenty ordered by Rumania, has two 950 h.p. Gnome-Rhone 14 No. radials. Normally fitted to the Do. 17 is the Daimler-Benz inverted vee, liquid-cooled.

M. Pierre Cot, the French Air Minister, speaking on Monday to airmen who had returned from the French Empire manœuvres, said that 98 machines had taken part in the flight from the home country and Africa to Indo-China. These manœuvres had demonstrated that France was in a position to send from Europe to Africa, in a few hours, squadrons whose bombing capacity was immense.

Twenty-five Years Ago

(From "Flight" of December 21, 1912.)

"Great strides have also been made in ascertaining the limitations of aircraft, and it is to be hoped that next year the artillery will be able to carry out firing experiments at objects in mid-air on Salisbury Plain. . . . It would be highly interesting, from a military standpoint, to ascertain whether artillery working in conjunction with powerful searchlights would be really effective in repulsing aircraft under such difficult conditions."

THE STREATHAM COMMON MYSTERY

—*and Its Solution*

YOU may not imagine that there is anything sinister about Streatham Common—that sloping piece of open space which coach-loads of air travellers get such an ample opportunity of examining while held up at the traffic lights at this point on the journey from Croydon Airport to London Town. Nor are you likely to associate this common with aviation, apart from the occasional presence over and thereon of elastically driven aerofoils and the fact that, on really clear days, the view from the summit may include aircraft landing at Croydon.

Yet I have just unravelled a very neat little mystery, completely aviational, concerning this open space. You see, Streatham Common displays on its verges small notice-boards that intrigue all boys who are old enough to read and young enough to use their imaginations. For these notices proclaim that the ground behind them may be used as an "Aircraft Emergency Landing Ground" after dark, and that if flares are lit the public must keep its distance.

Now, having plenty of imagination, but insufficient intelligence to keep pace with it, these proclamations troubled me. In the first place, I wanted to know, why *Streatham* Common? It slopes steeply down to a very busy main road, it is surrounded by trees, and has a path running across its centre which is flanked by a long row of metal railings. I believe it was this path that meant a crumpled wing for a Service pilot who once pulled off a forced landing there, only to have to swerve violently after touching-down in order to avoid a blissfully ignorant nursemaid and perambulator. Of course, that was in daylight, without those flares. But I could think of several much nicer places in the vicinity at which to deposit a sick Service aeroplane. Tooting Bec Common, for example, possesses some excellent open areas, on one of which an Avro once pulled off a safe dead-stick landing, to the vast disappointment and unrest of a small boy who missed the whole party. Clapham Common must be good because it once tempted a Moth pilot, who taxied to a garage, refuelled, and took off quite calmly. Wandsworth Common, too, has nice, big fields in places, while I believe that a banner-towing Avro—minus banner—got down satisfactorily, more or less, in the grounds of an asylum just by Wandsworth Common about a year ago. All these spaces are in the immediate vicinity of Streatham Common, at all events to machines (even with dead engines) flying as high as they should be flying over such a thickly populated area.

So, of course, I wanted to know, why *Streatham* Common? And what of those flares? My dull intelligence suggested a Service pilot, suddenly without his engine and conveniently above Streatham Common, wirelessing to his aerodrome, who would 'phone the local police station, who would dispatch a constable, who would call on a common-keeper, who would mount his bicycle (ancient) and ride to the Common to put a match to the flares. The flares would be such a help to the ambulance men and daily news-hawks.

I felt that it could not be quite like that, yet I could not recall seeing permanent flares flaring during the nights of air exercises over London which I once watched from this sinister common.

Aerofilms, Ltd.

Well, I carried my mystery around with me for a while. Sometimes I would visit the common and re-read those notices. I paced the landing run and, if I remember rightly, made it about 400 yards the longest way. I distinctly recalled having seen an Air Ministry official (?) descend from a very nice motor car and repaint the notices, aided by a man to hold the paint-pot. He might surely have landed by air, but perhaps that would have been a waste of flares and/or nursemaids.

At last I could keep my secret no longer, so I telephoned the Press Section of the Air Ministry. At first they just listened to my query and took my telephone number. At the next call I learned that there are no emergency landing grounds in the London Area, except for certain fields (big, I hope!) to be used during wartime, the whereabouts of which are not disclosed.

The Truth is Out

But I persevered, and the Air Ministry kindly made additional inquiries, and now the truth is out. My mystery is solved. Really, it's all quite simple. The Fighter Command, R.A.F., arranged some time ago to have these emergency landing grounds on public open spaces for use during air exercises and so forth, during which time flares were to be lit at the grounds to warn the public of possible invasions. Apparently their arrangements got as far as having the ground at Streatham Common, another at Wormwood Scrubs and one on private ground at Brooklands. The Bomber Command also had similar leanings. But the local authorities required so much notice as to when flares would be required that the scheme has been practically abandoned. So that is that, and I feel quite cheated of my sinister speculations.

But if emergency landing grounds are deemed desirable in the Metropolis, wouldn't it be rather nice if owners of open spaces, such as factory football fields, school playing-fields, etc., which are always deserted after dark, would let the Air Ministry plant special-colour lights thereon, thereby making these spaces into permanent emergency depositories? It would be such fun for factory workers to find a Battle or a Blenheim sitting between the goal-posts one morning.

W. BODDY.

Forthcoming Events

December 29. R.Ae.S. Weybridge Branch Lecture: "The Design of Duration Model Aircraft," by Mr. R. Bullock.

1938.

January 5. R.U.S.I. Lecture: "The Training of a Royal Air Force Pilot," by Air Vice-Marshal L. A Pattinson, Royal United Service Institution, 3 p.m.

January 11. R.Ae.S. Isle of Wight Branch Lecture: "Air Route and Aerodrome Control," by Capt. P. W. Lynch-Blosse.

January 13. R.Ae.S. Lecture*: "Radio as a Direct Aid to Landing Approach," by Sqn. Ldr. R. S. Blucke.

January 14. Strathtay Aero Club: Annual Ball.

January 18. R.Ae.S. Students' Section Lecture: "Turbulence and Skin Friction," by Mr. A. A. Hall.

January 19-21 (provisional). Aerodrome Owners' Association: Airports Exhibition, London.

January 20. R.Ae.S. Portsmouth Branch Lecture: "Aircraft of the Future," by A. Hessel Tiltman.

January 20. R.Ae.S. Coventry Branch Lecture: "Installation of Aero Engines," by Dr. G. P. Douglas.

January 25. R.Ae.S. Isle of Wight Branch Lecture: "Bird Flight," by Capt. J. Laurence Pritchard.

January 26. R.U.S.I. Lecture: "Imperial Air Routes," by Lieut.-Col. H. Burchall, Royal United Service Institution, 3 p.m.

January 28. Northamptonshire Aero Club: Annual Ball at Salon de Dance, Northampton.

February 9. York and Leeming Flying Club: Annual dance, Grand Hotel, Harrogate.

February 10. R.Ae.S. Portsmouth Branch Lecture: "Cowling and Cooling of Radial Engines," by Dr. G. P. Douglas.

February 17. R.Ae.S. Coventry Branch Lecture: "Aircraft Motive Power," by Major E. F. Green.

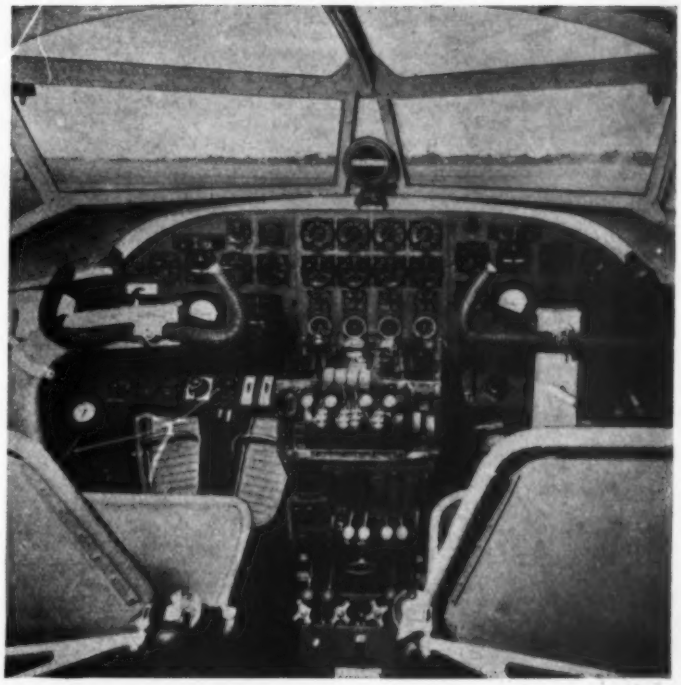
* All these lectures take place at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1, beginning at 6.30 p.m.

GERMANY'S LATEST

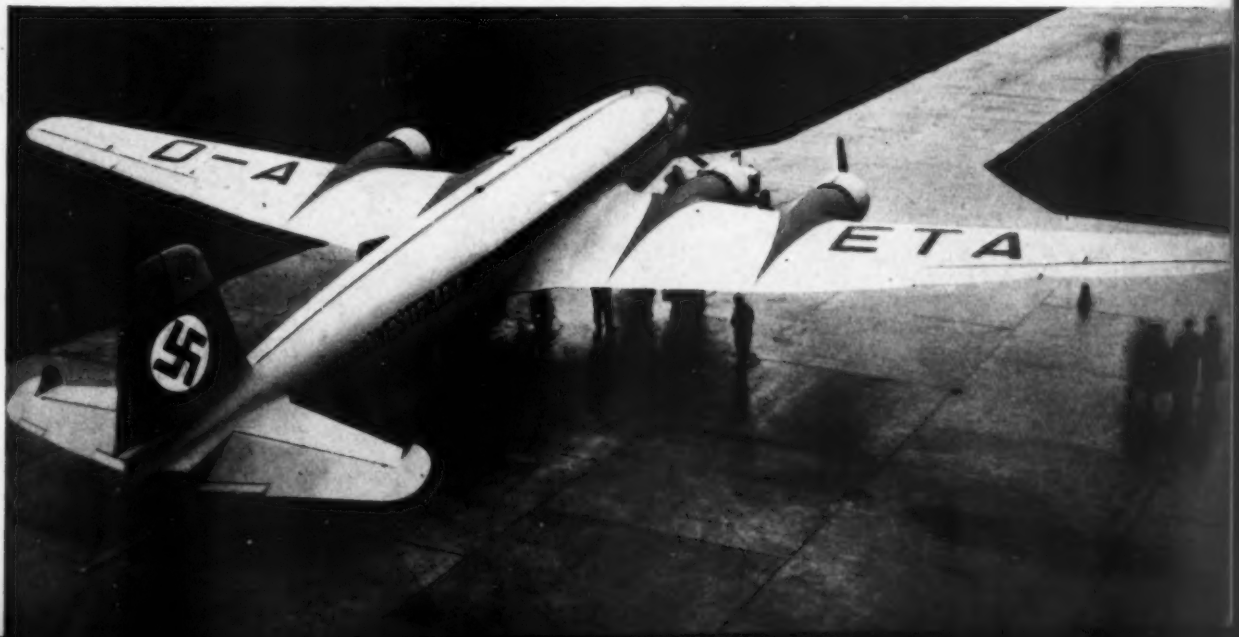
Efficiency and High Performance the Outstanding Features of the Focke-Wulf Condor

CONFORMING in almost every way to the modern formula (though not boasting twin rudders or a tricycle undercarriage), the Condor passenger aeroplane recently introduced by the Focke-Wulf Flugzeugbau, of Bremen, is an all-metal four-engined low-wing monoplane capable of a cruising speed of more than 200 m.p.h. when carrying a crew of four and twenty-six passengers in very great comfort.

These figures relate to the machine fitted with four B.M.W. 132 G engines of 720 h.p. each. If more powerful engines of the same make are fitted, the maximum speed goes up to 267 m.p.h. The manufacturers point out that with full payload and at 205 m.p.h. cruising speed, the Condor consumes but seven litres of fuel per passenger per 100 km., compared with an average of 11 litres per passenger per 100 km. at 150 m.p.h. of the German types in use before the Condor era. Coupled with this economic high speed is the ability of the machine to fly at 125 m.p.h. with two of its engines stopped, so that hurried forced landings should be of very rare occurrence indeed.



The cockpit of the Focke-Wulf Fw.200 or Condor. The pictures at the top and bottom of the page give a good idea of the clean general design. The engines are B.M.W. 132 G of 720 h.p. each.



View inside the main cabin, looking forward. Note the steps over the rear spar in the door to the smoking room. The construction is fairly clear from this picture, taken before the walls were soundproofed.

The cabin accommodation of the Condor is divided into a smoking compartment with seats for nine passengers, and behind that a non-smoking compartment with 17 seats. The rear wing spar runs through the cabin at the dividing wall, so that steps have had to be built in for this doorway. Otherwise the cabins are quite unencumbered by excrescences.

The high-backed, well-upholstered chairs are adjustable for angle, and in front of each passenger is a small table with reading lamp. Each passenger also has his adjustable ventilator. Full headroom is provided in both cabins. The windows are large and provided with curtains for protection against sunlight. Each window is provided with an emergency handle so that in case of accident it can be used as an emergency exit. Soundproofing is claimed to be such that conversation can be carried on without raising the voice.

In front of the smoking room is a compartment for hand luggage, and the pantry and kitchen, which is equipped for electric cooking. Ahead of these, and separated from them by a wall, is the wireless operator's office, adjoining the pilots' cockpit. From the latter, which is, of course, provided with dual controls, the view is excellent, due to the extent to which the nose of the fuselage projects ahead of the engines. The layout of the instrument board is shown in a photograph. It will be observed that the equipment is very complete, and that the essential dials are within view from both seats. The loop aerial is carried inside the non-metallic nose-piece of the fuselage, in front of the instrument board. Here it offers no air drag, and is protected against ice formation.

Aft of the main cabin are the lavatory and the main freight compartment, as well as a compartment for the mails. The latter has been specially designed for the easy loading and unloading of mail bags. When carrying its full complement of 26 passengers, the Focke-Wulf Condor has a still-air range of 775 miles at a cruising speed of 205 m.p.h. This corresponds to a useful load of 7,000 lb. At a range of 1,550 miles the useful load is 2,870 lb.

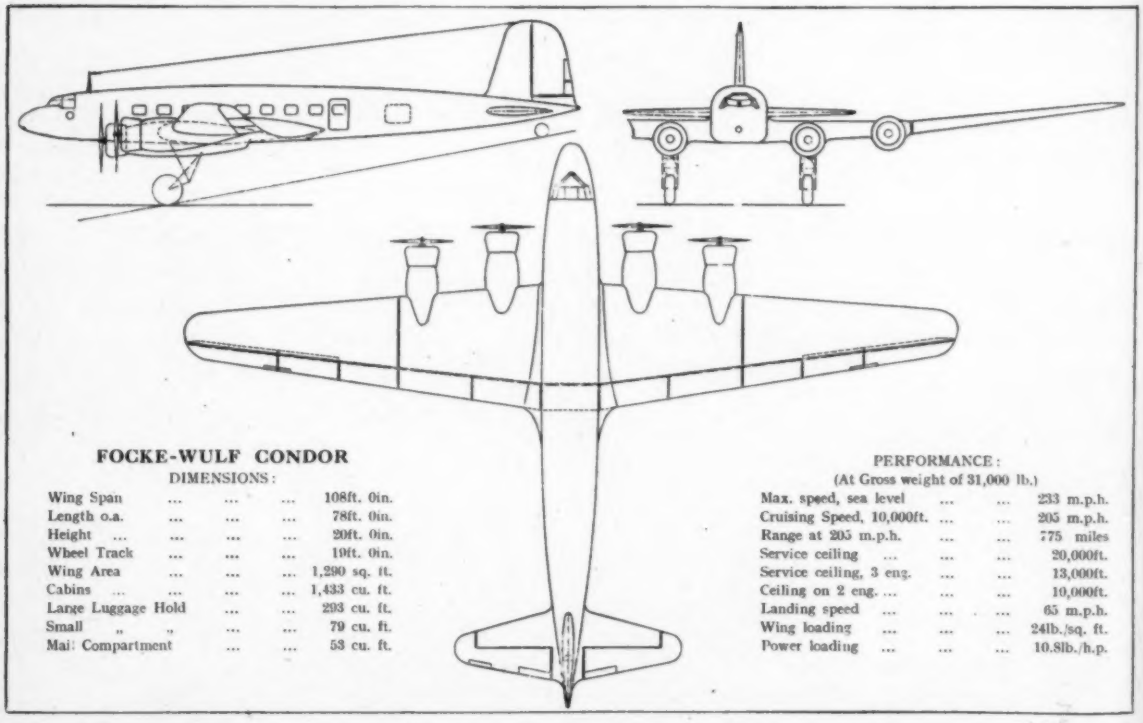
Electric Operation

An interesting part of the equipment is the electric control of the trimming tabs on rudder, elevator and ailerons. An electrically operated indicator in the pilots' cockpit shows the angle of these tabs at any instant.

The fuel is carried in the wing root, and each engine has its own petrol tank, separated from the others, although they can be connected when desired. In addition there is a small starting tank for each engine, normally containing fuel of a higher octane number than that in the main tanks. The engine installation has been so simplified that a complete engine unit can be changed in fifteen minutes.

In the undercarriage design an unusual feature is that the two main trap doors through which the wheels emerge close again when the wheels have reached the "down" position. This makes the undercarriage much less "dirty," aerodynamically speaking, for the take-off.

The main data are given in the general arrangement drawings below.



FOCKE-WULF CONDOR

DIMENSIONS:

Wing Span	108ft. 0in.
Length o.a.	78ft. 0in.
Height	20ft. 0in.
Wheel Track	19ft. 0in.
Wing Area	1,290 sq. ft.
Cabins	1,433 cu. ft.
Large Luggage Hold	293 cu. ft.
Small „ „	79 cu. ft.
Mail Compartment	53 cu. ft.

PERFORMANCE:

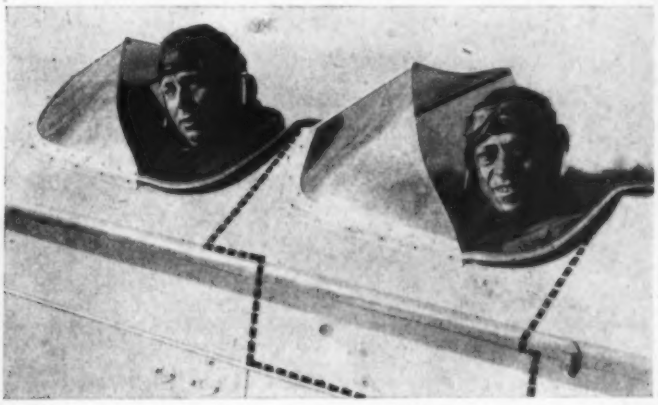
(At Gross weight of 31,000 lb.)

Max. speed, sea level	233 m.p.h.
Cruising Speed, 10,000ft.	205 m.p.h.
Range at 205 m.p.h.	775 miles
Service ceiling	20,000ft.
Service ceiling, 3 eng.	13,000ft.
Ceiling on 2 eng.	10,000ft.
Landing speed	65 m.p.h.
Wing loading	24lb./sq. ft.
Power loading	10.8lb./h.p.

PICTURES YOU MIGHT NEVER HAVE SEEN

Inspired by a Recent B.B.C. Feature, Flight's *Art Editor has Disinterred These Few Skeletons and Other Oddments (All Guaranteed Genuine and Unfaked) from His Cupboard*

Long-distance record breaker, who couldn't be bothered to half-roll on entering the Southern Hemisphere, lands in Australia.



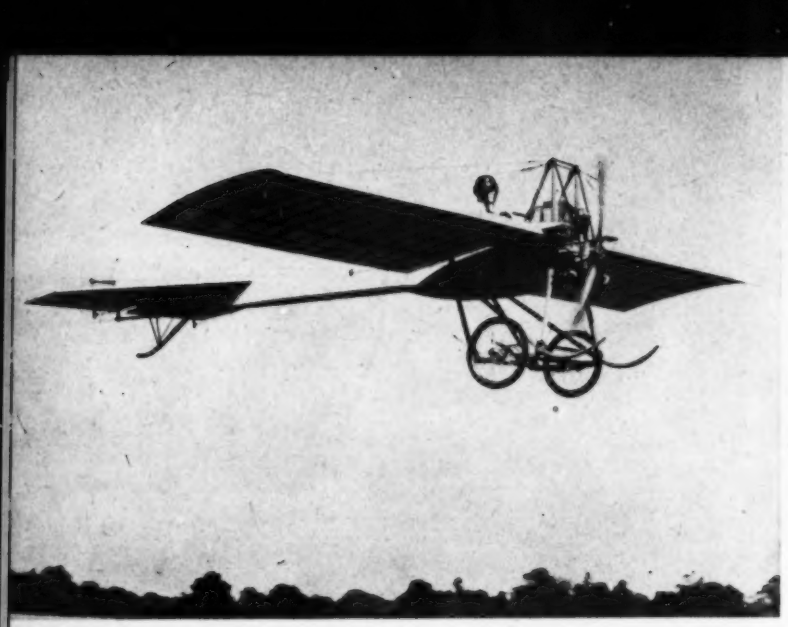
Two upholders of tradition in an aeroplane which doesn't let the side down, chaps. (Dotted line shows where it would if it did.)

The Loch Heed Monster finds G.E.s tough.

"I saw it first": Harpo, Groucho and Stanavo make their marx.

RECORD BREAKERS' CORNER: BY VARIOUS UNKIND CAMERAMEN

PRIVATE FLYING



TWENTY-FIVE YEARS OF PROGRESS: A 1911-type Deperdussin seen flying strongly (or "in full flight") in the year 1937. The engine is a 35 h.p. Y-type Anzani and the maximum speed is about 55 m.p.h. The pilot (with quaint accident-hat) is Mr. R. O. Shuttleworth, at whose works the machine, amongst others, was re-built.

Topics of the Day

Afflictions

ASSUREDLY the greater number of the people making up the human race are a little mad—ourselves (that is, the flying community) included. Unfortunately, it is not the pleasantly logical madness of the Marx Brothers. We are taken in nasty illogical fits, believing what we want to believe and producing the most involved and convincing arguments to show that what we want to believe or to do is a good and pious thing. "All right-thinking (or patriotic or sensible or just or knowledgeable) people will agree that . . ." might justifiably be translated as, "I think that . . . and as I have convinced myself that I am right-thinking (or patriotic or sensible or just or knowledgeable), then obviously all others must pipe down."

Since this is a journal devoted to aeronautical matters, I must regretfully ignore the fish that is thrown back into the sea, the coffee beans that are used as locomotive fodder, the fewer sales-smaller-wages-still-fewer-sales-still smaller-wages circle of viciousness, and the borrowing of battleships out of the day after to-morrow in order to defend ourselves against people to whom we lent similar battleships the day before yesterday. These appear to be the results of a sort of St. Vitus' dance with which the race is painfully afflicted.

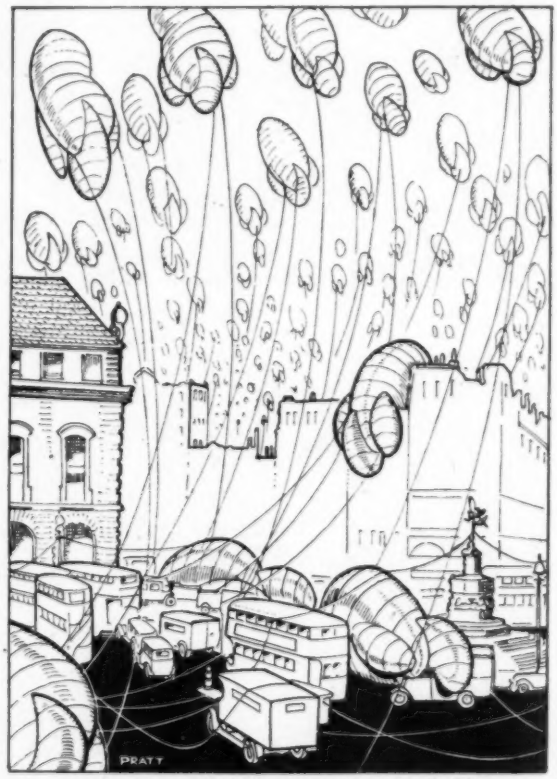
Nevertheless, though we of the aeronautical community view the world's happenings with variations of a sophisticated cynicism, we are not without the mote of madness. In a general way, we tend to rush furiously and very efficiently up alleys from which there is no possible turning. The development of modern transport and bomber flying is a case in point.

Tremendous ingenuity, energy and plain cash are rightly expended in the development of devices which will enable pilots to fly safely into weather-bound aerodromes at speeds in excess of 80 m.p.h.; still more plain cash is expended in the laying out of spaces vast enough to permit the modern machine to take the air and to leave it again in reasonable safety. I doubt if a quarter of the amount of this energy and cash is, or has been, devoted to the business of attempting to produce a variation of the flying machine which, while remaining equally efficient in other ways, will be a little less specialised. Not for a moment do I suggest that there was any other alley up which we *could* have run; the all-round 5-200 m.p.h. machine may be an impossible dream. All I say is that the rush has been made too quickly and efficiently and that the expenditures have been disproportionate.

Excelsior

JUST at the moment lots of people are working themselves to death in an endeavour to produce a really satisfactory method of assisted take-off. The wretched things have reached the stage when they only just (or don't) clear the boundaries of 2,000-yd. spaces, so we tie them on to other larger, more powerful and less heavily loaded machines, stick them on trolleys which rush up and down railway tracks, or shoot them out of cannons. I have only seen one system by which the machine carries, so to speak, its own assistance for take-offs and landings without needing anything very special in the way of ground etceteras. Presumably, in a few years' time we shall be shot up or trolleyed to minimum flying speed, and at the end of each journey the machine will have to be caught in a kind of gargantuan net. Flying costs: £4. Ground organisation costs: the interest on £4,000,000.

The word "net" reminds me of balloon barrages. Apparently, in order that we may sit by our domestic fires in mental comfort the sky must be obscured by a few thousand balloons on the ends of cables. After a line squall (no meteorological forecasts will be possible in war time) one can imagine the entire Army, Navy, Air Force and police force, with all the fire brigades, out on the job of disentangling the cables from one another, from chimneys, from power pylons, from trolley bus wires, from you and from me—while the citizens who are not electrocuted or decapitated will (four million in all) be hiding in a series of gas- and bomb-proof drainpipes (5ft. by 15ft.) constructed by some philanthropic millionaire who has sensibly purchased the South Pole and is living there in comparative comfort. (*Continued on next page.*)



". . . a few thousand balloons on the ends of cables . . . after a line squall."

Hush

THEN there is this secrecy business. The whole thing becomes very silly when one can, I am told, see descriptions of our very secret equipment in foreign publications while it is still impossible to talk about it over here. Not very long ago the Moldavian technical papers were forbidden to describe a certain machine which had been exhaustively dealt with (plus armament) in the papers of Ruritania, to whom several examples had been sold. The fact that Moldavia is supposed to be ready and willing to attack Ruritania at a moment's notice makes the entire performance a little more fatuous.

When I was in Munich eighteen months ago I read a paragraph in a reputable English paper to the effect that the food shortage there was acute and that its citizens were severely limited in their consumption of certain basic items of diet. While I read it I was endeavouring unsuccessfully to cope with a Wiener Schnitzel surrounded by a monumental pile of assorted vegetables; nationals at the surrounding tables were very successfully dealing with much larger mounds of similar comestibles.

Anybody ordering a meal at one of our inexpensive restaurants might be justified in writing a front-page story about food shortage and plain inability to cook anything at all. Anything, that is, except the bill.

Talking of the public prints, have you ever seen a dozen photographers scrambling around taking identical views from identical points of vantage, while an equal number of dispatch riders hang about in readiness to hurtle down damp tramlines with their several exclusive pictures of exactly the same subjects? And there may, after all, be no room for any of the pictures in any of the papers. Instead, one reads: "Mother of Eight Eats Black Pudding, Dies" in the brand new journalistic style invented by American headline writers some ten years ago and recently imported into this country with a great flourish for the dazzlement of pinheads.

P.S.—I've just heard Sqdn. Ldr. Buxton's paper. The discussion was intelligent, to the point and generously informative. Sailplane enthusiasts came from all over the country. Power-aeroplane designers and experts were conspicuous by their absence. Maybe they know all there is to be known. INDICATOR.

FROM the CLUBS and SCHOOLS

YORKSHIRE

YORKSHIRE—situated in a snowbound countryside—has made the best of the circumstances by taking photographs from the air for the Press. Club activities for the New Year include a dance to be held on January 8 in the clubhouse.

READING

Four days of fog have seriously interfered with flying activities. Mr. Beale Brown has joined the club with the intention of obtaining a "B" licence. A dance is to be held on January 6.

HANWORTH

A minimum amount of flying has been put in owing to the fog and rain, but on the one fine day Mr. A. Gazda completed the tests for his "A" licence. The total flying for the week ended December 18 amounted to 33 hr. 25 min.

YAPTON

Yapton Aero Club will be closed from December 23 to 27, both days inclusive. Although flying was handicapped severely by bad weather and the flying times only totalled 17 hr. 40 min., Mr. J. D. Hayman flew his first solo and completed his "A" licence tests, Mr. L. A. Groom also carried out his tests.

BOMBAY

Of the 221 hours' flying logged for the month of November, night flying was carried out during two weeks and cross-country flights were made to several aerodromes. Messrs. R. N. Tilley, C. B. Daruwalla, P. M. D. Thackersey, and P. A. Mehta made first solos and Mr. J. G. Pathare completed "A" licence tests.

CINQUE PORTS

A large party from Lympne attended the Eastbourne Flying Club's annual dinner and dance. A Christmas party has been organised for Boxing Day. Fog, low cloud and rain rather lowered the flying time for the week and 37 hours were logged. Mr. G. Uden and Mr. J. Richards have passed their "A" licence tests and Mr. D. Taylor managed a successful first solo.

HERTS AND ESSEX

The club will be closed on Christmas Day to reopen on Sunday, and the annual Christmas party, followed by a dance, will be held on Monday, December 27. Copies of the club magazine, *The Broxbourne Flyer*, are now available. This publication is to be issued monthly and is edited by Mr. J. H. Reyner. Flying was possible on ten days of the fortnight ended December 16 and 69 hr. 13 min. were spent in the air.

LONDON

For once in a way Hatfield, which is usually one of the better spots from the flying point of view, suffered from weather difficulties last week and only 20 hours were flown. The major events of the week were the annual dinner (reported on p. 628) and the turkey lunch last Sunday. The latter was markedly successful and the organisers must have had some difficulty in arranging the restaurant so that everyone could be accommodated.

BROOKLANDS

Needless to say, the week-end weather conditions caused the projected good will flight to Shoreham to be cancelled and Father Christmas was duly photographed at Brooklands. This weather, however, did not prevent some forty members and guests from attending the Christmas dinner and party on Sunday evening—though it *did* prevent them from going home after the festivities. Many, if not all, of them were forced to spend what little remained of the night at the club.

C.A.S.C.

On Sunday last at Cambridge members flew 5 hr. 10 min. in spite of poor visibility. There will be no flying at Cambridge over the Christmas holidays as the aerodrome will be closed on the 25th, 26th and 27th December.

MARSHALL'S

The flying times at Marshall's Flying School for the week ended December 19 totalled 25 hr. 50 min. The low hourage was due to the foggy weather. Mr. Hays passed the flying and cross-country tests for his "B" licence at Hendon.

DONCASTER

Although the Doncaster Aero Club only opened during the first week of December, membership is growing steadily. They have been unfortunate in experiencing continual QBI conditions, but are still as cheerful as ever though they say that "getting lost on a circuit is a bit depressing."

YORK AND LEEMING

Herr Wendel, the German pilot who gave such an interesting display of aerobatics at the York meeting, and who met with a bad crash a week afterwards, has now written both to *Flight* and to York to say that he has almost recovered from his injuries. New members' names include that of Master William Humble, then aged one day.

NORFOLK AND NORWICH

Flying being handicapped by bad weather, social activities are in evidence. On Tuesday, December 14, Mr. W. Carter, the chief ground engineer, gave a lecture to the pilots on engines, and last Tuesday he gave another talk dealing with airframes. A dance will be held on New Year's Eve, but early application must be made for the tickets. Mr. B. Hirst has passed his "A" licence tests. A flying scholarship scheme for business houses is being considered. In the meantime, gliding is going ahead rapidly.

The Battle of Eastbourne

THE Eastbourne Club has gained a certain amount of fame by its determined campaign for municipal recognition of Wilmington Aerodrome. As reported in *Flight* last week, the campaign has now culminated in the granting of a £100 annual subsidy for seven years—in the face of no little opposition.

At the annual dinner, held at the Grand Hotel, Eastbourne, last Friday, we looked forward to hearing the whole story in the speeches. We were not disappointed. Capt. E. I. Short, hon. secretary and campaigner-in-chief, was in great form.

Replying to the toast of "The Club," proposed by Mr. C. S. Taylor, M.P. for Eastbourne, Capt. Short started off with this very typical broadside: "Our anti-air council has been converted to a manner of thinking into which I've tried to lead them for four years." He went on to pay tributes to the Mayor (Ald. Wheeler) and borough treasurer (Col. Sparrow), who, it seemed, had been largely instrumental in guiding through the subsidy resolution.

But, also very characteristically, Capt. Short did not let it rest at that. He spoke of "the paltry 1/36th of a penny rate" which the subsidy represented, and admitted quite unblushingly that he only regarded it as the "thin end of the wedge"—the thick end, of course, being the fully fledged, municipally sponsored airport which he is determined that Eastbourne shall ultimately have. (*Continued overleaf.*)

Private Flying

He seems to have a stout ally in the Mayor, who (proposing the toast "Civil Aviation") said: "I have been criticised, but I don't intend to withdraw, and I don't regret one single word."

Capt. H. A. Love (chief instructor), sharing Capt. Short's response to the toast of "The Club," spoke of the progress made during the year, and said there had been a gratifying increase in membership on the flying side. Twenty-four "A" licences had been taken—an increase of 50 per cent.

Capt. Love said that while he was rather fully occupied at Shoreham nowadays, his duties at Wilmington had now been most efficiently taken over by F/O Hazell.

F/O David Llewellyn responded to the Mayor's toast of "Civil Aviation." Mr. Howard Horner (club chairman) briefly proposed "The Visitors," to which Mr. Ronald Cardwell replied, even more briefly, with a delightful little speech, mainly limited to: "I see that dancing starts at 9.45. It is now 10 p.m. That gives me 11 hours 15 minutes in which to reply to this toast"—which, in the cold light of day, seems to defy analysis, but which, coming after several uncommonly long orations, struck a hugely popular note.

Mr. "Bill" Davis—heading, with Mrs. Bill, quite a large contingent from Lympne—proposed "The Chairman" (Capt. Love), and with that the party adjourned for dancing. Afterwards, in the wee sma' hours, little exploration parties might have been seen creeping along the hotel corridors, repeating a room number like a password; actually they were in search of a semi-private continuation of the revelry, but as each posse seemed to be in possession of a different password there were one or two rather disconcerting adventures until the main force, so to speak, was run to earth, comfortably bivouacked, with ample supplies, under the command of Capt. Short.

SAILPLANE DEVELOPMENT

Sqn. Ldr. Buxton, in a R.Ae.S. Lecture, Reviews Progress : Modern Technique

SAILPLANE development, and soaring generally, from the points of view of the pilot, the meteorologist, the engineer and the gliding club, formed the subject of a comprehensive lecture delivered in an abbreviated form before the Royal Aeronautical Society last Thursday by Sqn. Ldr. G. M. Buxton, who, of course, is well known as an expert pilot and designer of sailplanes.

Sqn. Ldr. Buxton's paper recalled the early gliding of Lilenthal in "hang" gliders and the work of the Wright brothers, who studied what Lilenthal had done and realised the shortcomings of his method of moving the c.g. They designed a glider with the idea of making it controllable by moving the c.p. The lecturer said: "The Wright machine was soared for nine minutes on one occasion in 1909, but unfortunately they had already fitted a little engine in their machine and were absorbed with the problems of the aeroplane."

It did not seem likely that pure dynamic soaring would be possible for sailplanes. Sqn. Ldr. Buxton did not see birds using it, though they had the advantage in their small size and great manœuvrability. The exception to this was their flying in the disturbed air among the waves of the sea.

Dynamic soaring was described as soaring in a fluctuating wind. As an example of lurking dangers, Sqn. Ldr. Buxton quoted the case of a military aeroplane in India which, just after it had crossed the aerodrome boundary to land, fell to the ground. The pilot said that he had been flying at an adequate speed, and, according to a witness, the wind had changed its direction completely at the crucial moment, so that the pilot suddenly changed to an area where he was coming in with the wind. The wind had been about 16 m.p.h. against him and became about 5 m.p.h. with him, reducing his air speed so that he stalled.

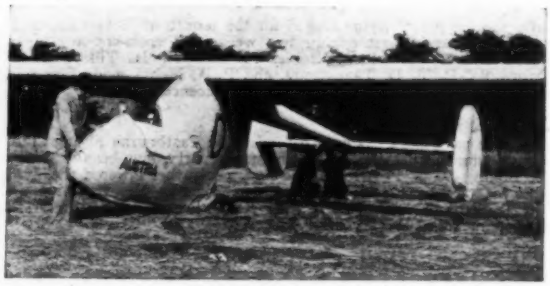
Dynamic Soaring

To get maximum efficiency from the wind the sailplane had to act on it in such a way as to reduce the variations, or, rather, to eliminate them so that the wind speed was uniform. One way to do this was by climbing and diving. As the most perturbed air with the greatest amount of available energy was near the ground it seemed that dynamic flight was not likely to become popular. It was, however, possible, while soaring in other ways, to make considerable use of dynamic effects. The most familiar one was the gain of energy when rising from the ground against the wind. Sqn. Ldr. Buxton mentioned the bowl at the north end of the soaring ground of the London Gliding Club at Dunstable. The ground was a straight ridge facing south. When the conditions were very smooth and there was a southerly wind blowing into the bowl, the air speed rose as one crossed over the lip of the bowl. This happened if one flew low down-wind over the lip of any cliff, although one was usually too busy to notice it in such conditions. However, at Dunstable it was possible to turn and fly out over the plain, and if one turned rather sharply coming out over the plain when pointing up wind the air speed was seen to increase again as the fresh wind was met. In smooth conditions, when it was possible to fly over the crest of the hill at a low height, it was possible to make continuous circles over the bowl, using this effect to reinforce the hill lift.

When considering the movement of the air it was clear that a horizontal gust could not exist without a vertical gust, which should also be used.

The lecturer summarised the progress up to 1931, recalling that in 1922 Hentzen and Martens made a soaring flight of an hour at Wasserkuppe in the Vampire, which was the first example of modern sailplane and was very similar to the modern refined type. The Roemryke Berge of 1924 had trailing-edge flaps, and after development made an historic distance flight. In 1926 Max Kegel went up in a cloud and covered 54 km., and in 1928 Kronfeld made flights under clouds. The last, and perhaps the prettiest, development of thermal soaring was largely due to Herr Hirth. The great work of Alexander Lippisch was given due mention.

The new beginning of gliding as a sport in England was at Itford in 1922, where, on the last day of the competition, a world's record for duration was made by Maneyrol in a tandem Peyret monoplane with a flight of 3 hr. 21 min. The effort aroused by this beginning was diverted by a competition the next year for small power machines, which were given the unfortunate name of power gliders in an attempt to harness the attractions of soaring to this utilitarian purpose, and the art lay dormant in England until the revival in 1930, of which the chief feature was the tour of Herr Kronfeld with the Wien and Herr Magersuppe with the Professor. Much enthusiasm was aroused and clubs were formed all over the country. At one time there were more than 100, but of these only half a dozen or so had survived.



The Austria, probably the most efficient sailplane ever built, at Hanworth in 1931. (*Flight* photograph.)

The British Gliding Association, which was set up as a central organisation, was not able to give financial assistance to clubs, except by the means of providing them with gliders on hire-purchase terms, and was not able to give the technical advice in the form that was needed.

Sqn. Ldr. Buxton commended the London Gliding Club and referred to the tenacity of its members which allowed it to survive.

Returning to high-performance flying, the lecturer said that the aerodynamic problems were understood by 1930, and there had been no advance in plain performance since that date, although stability and manœuvrability of sailplanes had increased and there had been great improvements in piloting technique and meteorological knowledge.

The lecturer then gave the major characteristics of the Wien, the Kakadu and the Fafnir I. Mention was also made of a contemporary English glider, the Scud, designed by Mr. L. E. Baynes. The tip cord of the tapered cantilever wing was

0.33 of the chord at the root, a ratio which had been adopted again after an excursion to higher taper ratios.

Dr. Kuppe, who designed the Kakadu, was also responsible for the Austria, first flown in 1931. This was perhaps the most remarkable sailplane ever built. Characteristics were: Span, 98ft.; wing area, 376 sq. ft.; tailplane and elevators, 35.8 sq. ft.; rudders and fins, 2×11.2 sq. ft.; complete wing and ailerons, 580 lb.; tail unit, 68.5 lb.; body, skid and instruments, 216 lb.; weight empty, 865 lb.; pilot, 154 lb.; parachute, 15.4 lb.; flying weight, 1,032 lb.; wing loading, 2.75 lb. sq./ft.; span loading, 0.106 lb. sq./ft. The wing was fitted with flaps.

Soon after the production of the Austria, Sqn. Ldr. Buxton himself designed the Hjordis sailplane. This was intended for the best gliding angle, which lead to slightly different results as compared with a design for the lowest sinking speed. The span was 51ft., area 123 sq. ft. and empty weight 350 lb. A taper ratio of 4 to 1 was adopted, and the total twist was 6 deg. The controls were rather unsuitable for modern flying, as they were designed to be as sensitive as possible. The ailerons were controlled by a wheel, which was a hindrance to the popularity of the machine.

Soaring might be divided into hill soaring and soaring away from hills. The former was done by flying in the rising air deflected upwards by hills, or some other obstacle, when the wind was blowing. It was possible to make long-distance flights if continuous ranges of hills were available.

Dealing with "front" soaring, Sqn. Ldr. Buxton said that the front was the line of meeting of warm and cold air masses. One feature which was important to the sailplane pilot was that the most advanced part of the cold air was at a height above the ground. The strongest up-currents were just before this position and were fed by the air that had been trapped under the advancing cold air as well as by the warm air that was just in front of it. As the best up-current was at some height above the ground, the pilot must be at a certain height before he could hope to be able to make use of a front.

Thermal Soaring

Thermal soaring could only occur when the atmosphere was unstable. There were a number of days in summer when this was the case and when there were up-currents great enough to be used for soaring. The technique required the use of a rate-of-climb indicator and no one was able to do thermal soaring in this country until one had been evolved. Sqn. Ldr. Buxton described the efforts made to develop such an instrument. The first successful one was made by David Dent. The lecturer recalled the first thermal flights in England, which were made by Eric Collins in 1931. The following year thermal soaring had become commonplace and now there are about thirty silver "C" badges awarded in England, compared with forty of the much easier "C" badges awarded then.

The preliminary to thermal soaring was to get away from the earth to a height where the up-currents were well developed. This might be done by hill soaring, towing by an aeroplane or even winch launching. If the pilot were hill soaring he would soar as far in front of the hill as he could while searching for a thermal. When he felt lift and saw from his variometer that he was rising, he circled and sought to adjust his circle so that it was entirely within the up-current. As he travelled with the wind, he would soon be over the hill and he had then to decide if the thermal up-current was strong enough to sustain him without the assistance of the up-current over the hill.

Discussing the most difficult thermal flight, the distance flight, Sqn. Ldr. Buxton said the easiest procedure for a pilot would be for him to confine his attention to gaining height by circling in thermals and to drift with the wind as long as he was able to keep in the air. It was difficult for a pilot to decide when to continue circling in a thermal and when to leave it and glide straight. The pilot had to find out the height at which the thermals were most vigorous and glide at that height. The lapse-rate which measured the instability of the atmosphere, and thus the magnitude of up-currents, was not constant at all levels. The general instability of the air, particularly of the lower layers, and the local heating of bubbles of warm air, depended on the type of ground on which the sun was acting or had acted. The information about this was empirical and somewhat conflicting. It seemed that a cornfield often was a source of heat for warming the air and thus caused thermal bubbles to form. Towns with their red roofs absorbed and radiating the heat of the sun were often found to cause thermal bubbles, and big towns particularly did so possibly owing to the amount of heat given out by industrial processes as well as the heat gained from the sun.

Woods were said to cause down-currents, and they were also said to cause up-currents. It may have been that they absorbed the heat and slowly gained temperature in the morning, and, keeping the heat better than other areas, gave it out later in the day. The woods of Germany seemed to have been specially good as sources of thermal up-currents; these woods were often of Scots pine, grown on light sandy soil, which might have contributed to the effect. The ground at Dunstable seemed to have been rich in thermals, which might have been due to the chalky nature of the ground.

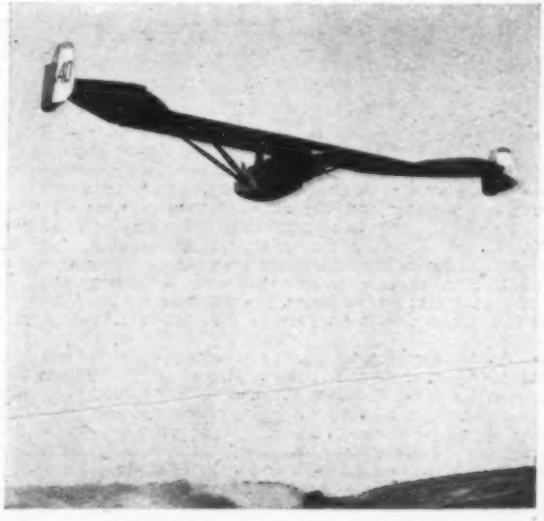
Water had a big capacity for heat, and so behaved in the same way as was described in the supposition of the behaviour of woods. Thus, if the ground was cooled quickly, say by a cold wind, a patch of water was likely to remain warmer than the ground and so to be the cause of up-currents. This was obviously likely to happen in autumn, and he expected that it would be found easier to fly the Channel in autumn than in spring. Conversely, if the ground had been heated quickly the water would be likely to be cooler and would have down-currents over it. These heating effects were surprisingly local, and the lecturer had, when flying an aeroplane, felt a considerable bump over a black tarmac road which was only about 35 feet wide. Perhaps someone would make a great distance flight along a road before they were all turned into white concrete.

Cloud Soaring

It was known from many experiences that violent conditions might be met in clouds. Hailstones were maintained or raised in the atmosphere by up-currents while they were being formed. For cloud flying the pilot needed a sailplane of suitable strength and stability, a parachute, and blind-flying instruments. It was necessary to be able to get out of a cloud if conditions became rough, for it was not possible to dive out, because the sailplane, or, indeed, an aeroplane, could not be made strong enough to withstand at high speed the gusts which might be met. The lecturer hoped it might be possible to devise a routine for getting into a spin which could be used by a pilot even when he was in a complete muddle and travelling at high speed. An attractive alternative plan was to provide an air brake which could be applied by the pilot at any speed and which would keep the speed to a safe figure in any attitude. It might conveniently be possible to provide an air brake that would prevent the speed exceeding a safe one without it being strong enough to be applied if the pilot had already exceeded this safe speed. It might even be possible to provide the pilot with some sort of warning, such as a whistle, which would sound at the safe speed and so warn the pilot to apply the brakes before he went any faster; if the pilot acted promptly his craft would be prevented from attaining the speed that the modern sailplane would reach in a dive. The best way to climb in a cloud was to circle in the best up-current in that cloud. Another method was to "sew" the cloud, i.e., to fly straight through it, turn in the open air, and fly back again.

Discussing electrical discharge, the lecturer said it might be desirable to bond together all the metal parts. The problem of icing also seemed to be one that had to be faced.

The needs of cloud flying had caused some evolution in the design of sailplanes between 1931 and 1937. The chief changes were an increase in strength and in the stability of a sailplane to make it easier to fly blind. The need for a good performance had caused all cockpits to be closed with a streamline cover.



An old example of tailless sailplane such as was suggested by Sqn. Ldr. Buxton—the *Stadt Magdeburg*.

Private Flying

The lecturer then gave details of the King Kite, a British sailplane, three examples of which built by Slingsby Sailplanes for the International Competition at the Wasserkuppe. This competition showed that we were behind the Germans, and, indeed, behind the Poles and Swiss. The lecturer supposed that our pilots needed more practice and that some system of producing new designs was needed. There was a need for a British machine of high performance and moderate price. It was apparent from the success of the Austria I that the greater part of the size, weight, and resistance of the fuselage of the ordinary sailplane was unnecessary for the primary purposes of streamlining the body of the pilot and carrying a comparatively small load felt by the tail. The pros and cons of a tailless sailplane were reviewed, and it was stated that the construction should be fairly simple and the price cheap.

The Discussion

LORD SEMPILL was in the chair, and after congratulating Sqn. Ldr. Buxton he called on Prof. G. T. R. Hill to open the discussion.

Prof. Hill recalled some very ancient history, and spoke of the not so far-off days when his glider's span was limited by the size of a room at the top of a house and how, after repeated attempts during a day (at the age of 15) he finally found himself in the air in pitch darkness. He said that sailplane makers had been first to appreciate the importance of surface finish, and asked how gliding angles were measured. He did not think that wing stiffness, other than torsion, was very necessary, and looked forward with special hope, remembering his Pterodactyl, to the plans for a tailless sailplane.

Mr. W. O. Manning wondered whether improved performances were due to better design or to improved piloting skill, and suggested proper tests for all sailplanes in a wind tunnel. He suggested, too, that high aspect ratio was a fetish, explaining that the L/D curves flattened out above the figure 17. A figure of 25 was, he thought, as high as was necessary.

As one who had studied under Lippisch for a number of years, Mr. B. S. Shenston's contribution was particularly interesting. He said that, in Germany, L/D had been accurately determined in very early morning flights up to 6,000 feet. The Fafnir II figure was 26 at 40 m.p.h., suggesting a skin-drag efficiency of 85 per cent. In comparison the most efficient power-plane, the Heinkel 70, gave a figure of 64 per cent. He was interested in the question of laminar and turbulent flow, and instanced dust tests which had been made. He was critical of the particular wing section used in the King Kite, and suggested the tip section should have been symmetrical so that the lift did not drop off there and prelude the spin to which this particular machine was rather prone. He asked for an opinion on the maximum gust speed which should be taken in design calculation.

Prof. D. Brunt, who is a professional meteorologist and who captained the British team at the Wasserkuppe, suggested that it was through lack of competition experience our team failed to do particularly well. Competitions encouraged pilots to go up and do their utmost in all manner of conditions, thereby obtaining experience which could not otherwise be obtained. He hoped that soaring pilots would supply as much meteorological information as possible, and remarked that, on the basis of their knowledge at one time, meteorologists would have denied the presence of up-currents sufficiently powerful to make soaring possible.

Before going on to describe some of the more interesting pictures of the Austria I and of the machine which was later developed by the same designer for all-round work, Mr. R. Kronfeld asked what was the limit of development. He rightly pointed out that real efficiency costs enormous sums of money and suggested limited classes in competitions. Designs should be developed so that flying could be carried out every day. The second machine which he remarked upon was, in fact, designed with this object in view, with detachable wing tips and replaceable sections for different work.

Mr. P. A. Wills said that factors of safety tended to be lower in the case of the machines used by some of the other competitors, and suggested that lower factors might be used in the case of machines which were not going to be flown in clouds. How, he asked the lecturer, should one recover from an accidentally inverted position without over-stressing the machine?

Mr. L. E. Baynes apologised for the fact that he had produced no sailplane design since the Scud, and explained that his time had been spent rather in reducing his own sinking speed. He suggested machines with a greater speed range, and spoke of the importance of the body shape and interference drag. He did not like the flying wing idea, and suggested rather a flying body—proceeding thereupon to draw his ideas on the blackboard, showing how the wing section and shape might develop into a fuselage.

Finally, the evening being already far gone, Prof. Hill, who had taken the chair after Lord Sempill had departed to another meeting, apologised to those of the audience who could not be allowed to have their say, and asked Mr. A. G. Pugsley, who had been largely responsible for the Farnborough tests of the King Kite, to close the discussion. Mr. Pugsley said that normal aeroplane standards had been used in the flutter tests. He suggested that the structure mass of a wing should be arranged well forward.

Sqn. Ldr. Buxton's replies were necessarily short. He explained that gliding angles were deduced rather than calculated, and that full-scale tests in the atmosphere were to be preferred. He mentioned experiments which had been made with a hole in the wing using a stethoscope to hear the sounds as the laminar flow changed to one of a turbulent nature. He suggested that the King Kite's spinning tendency might be due to tail design. He did not think that there was any connection between span and manœuvrability, and suggested that careful ply-grain arrangements might be used to obtain wing stiffness without increasing depth. Replying to Mr. Wills, his answer was simply that one should not come out of the clouds in the inverted position!

The London Club's Party

IN the customary manner speeches after the London Aeroplane Club's annual dinner were reduced to basic minimum—to wit, one by Major K. M. Beaumont, the chairman.

He briefly outlined the club's work during the year, in which 4,606 hours had been flown, and 54 "A" licences and 11 "B" licences obtained.

Lt. Col. Sir Francis Shelmerdine was the guest of honour and Lady Shelmerdine duly presented the cups for the club's autumn competitions. That for navigation, presented by Mr. E. Hicks, was collected by Mr. D. E. Henderson; Mr. F. A. Matusch's map-reading cup went to Mr. H. K. Cartwright; the aerobatics cup, presented by Mr. P. H. P. Sprosen, was taken by Mr. O. Morrogh Ryan; and Mr. M. Young's forced landings cup was won by the youngest of the de Havilland brothers. Dancing, interspersed with cabaret items, continued into the small hours.

An Instructional Point

A CASE of particular interest to flying clubs was heard on December 16, when the Newcastle Aero Club, an experienced member and the former instructor were all fined after pleading guilty to charges concerning flying irregularities. Mr. W. M. Mackay, the member, pleaded guilty to five charges of giving flying instruction when he did not hold a "B" licence or an endorsement of his "A" licence allowing him to instruct; Mr. H. Mitchell, the instructor, pleaded guilty to aiding and abetting these offences; and the Club to permitting them.

A separate charge of piloting a machine for a lucrative purpose when she was not the holder of a "B" licence was preferred against the Hon. Mrs. M. King-Farlow, but this was temporarily adjourned. The police said that the Club were in full possession of the facts as to what they could and could not do, while Mr. J. A. Linsley, for the Club, said that they had acted in good faith and denied that they knowingly condoned the offence. Doubt had been cast upon the position of an honorary instructor and the Club had interpreted the regulations to mean that where the instructor and the pupil were members of the same club it did not matter whether payment for instruction had been made or not. They had assumed that the instruction given under these conditions would be in order.

Mr. A. D. Fyfe said that Mr. Mitchell admitted that he had some doubt as to the legality of the instructions being given, but, seeing a note in the minute book following the visit to the Air Ministry's Information Bureau by the chairman of the Club, he thought his own interpretation of the regulations to be wrong.

On the adjourned charge the club was fined for permitting "A" licence pilots to participate in Army co-operation flying.

Just in case there are any other clubs, instructors, or pilots who have not realised the importance and necessity of understanding the requirements in such cases we have given the facts. The club concerned probably failed to understand the position and in this case it is suffering as a scapegoat for the present and future errors of many others. The position, incidentally, is now under review by a special committee which has been appointed by the Council of Associated Light Aeroplane Clubs.

An Airwork Affair

THERE was no need to ask if the Hestonites who went to Richmond last Friday for the annual dinner of Airwork, Ltd., enjoyed themselves. Any suggestion of formality at the beginning was banished with the bangs of crackers and the ensuing blasts from various musical (?) instruments.

A spot of what radio-expert Denman might have described as acoustic feed-back between "mike" and loud-speakers tended to howl down the speakers, but one gathered that Mr. H. N. St. V. Norman, the chairman, felt that this, the ninth and largest Airwork party, might be regarded as commemorating the sale of Heston airport to the Air Ministry. He spoke of the formation of the new company (mentioned in *Flight* last week), with Mr. Muntz as chairman, and said that the building operations at Heston heralded new offices, hangars, and so forth for Airwork. The present central repair shop was shortly to be given over to British Airways.

Mr. Norman sent greetings to all Airwork staff, mentioning Manchester, Castle Bromwich, Bristol and the Far North.

The health of the chairman was proposed by Mr. R. P. G. Denman, and "For He's a Jolly Good Fellow" was sung.

Dancing began shortly after dinner and was interspersed with novelty items and a first-class conjuring display.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News : Official Announcements : Military Aviation Abroad

A Group Command

AIR COMMODORE TRAFFORD LEIGH LEIGH-MALLORY, D.S.O., has been appointed to the command of No. 12 (Fighter) Group, Royal Air Force, with effect from December 14.

Air Commodore T. L. Leigh-Mallory was seconded to the Royal Flying Corps, as a Flying Officer, from the Army in July, 1916. For his services during the Great War he was awarded the Distinguished Service Order, as well as being mentioned in despatches. He was granted a permanent commission in the Royal Air Force, with the rank of Squadron Leader, in August, 1919.

In June, 1916, Air Commodore Leigh-Mallory graduated in flying at the Civil Flying School, and a year later was appointed to command No. 15 Reserve Squadron. He attended a course at the Senior Officers' School in 1922, and in May the following year was appointed to the Air Ministry for Air Staff duties. In 1925 Air Commodore Leigh-Mallory passed a course at the Royal Air Force Staff College and in the following year was posted to No. 22 Group Headquarters for Air Staff duties. In 1927 he was appointed to command the School of Army Co-operation, and in 1930 was appointed Instructor at the Army Staff College, Camberley. Air Commodore Leigh-Mallory held the post of Deputy Director of Staff Duties at the Air Ministry from August to December, 1931, and again from October, 1932, to January, 1934

He attended a course at the Imperial Defence College during 1934, and in December of that year was appointed to command No. 2 Flying Training School. Since December, 1935, he has been posted to Headquarters, British Forces in Iraq, as Senior Air Staff Officer.

He was promoted to Wing Commander in 1925, to Group Captain in 1932, and to his present rank in 1936.

Cranwell College Inspection

THE Chief of the Air Staff, Air Chief Marshal Sir Cyril Newall, K.C.B., C.M.G., C.B.E., A.M., inspected the R.A.F. College, Cranwell, last Friday, on the occasion of passing out Flight Cadets. The following are extracts from the report of the Commandant, Air Vice-Marshal Baldwin, D.S.O., O.B.E.:

There are 149 Flight Cadets at present on the strength of the R.A.F. College.

The general conduct of Flight Cadets has been quite satisfactory. There has been a relaxation of certain rules of the College giving Cadets more opportunity to exercise their own discretion in the manner of conducting their lives, the idea being that when a Cadet arrives at Cranwell he should be free from the type of restrictions of school life, and his life here should be comparable to that of a university undergraduate. The removal of these restrictions has proved beneficial, and it is hoped that it will lead to Cadets showing more individuality and self-reliance.

There are 33 Flight Cadets passing out at the end of this term. These Cadets have now been in the Advanced Training Squadron for two terms, during which time they have carried out exactly the same programme of flying and armament as Advanced Training Squadrons at all the Flying Training Schools. Unfortunately, owing to the water-logged condition of the aerodrome at North Coates Fitties, the Squadron has been unable to go to Armament Training Camp, but has had to carry out air firing and bombing training from Cranwell.

The average time flown by Flight Cadets now passing out is 183 hours.

The standard of navigation has improved and every effort is being made to increase the amount of navigational flying done at this College as it is realised that, whereas it is useful to be able to carry out aerobatics (and forced landings), at the same time the design of modern aeroplanes does not lend itself to aerobatics (or forced landings), and the culmination of a cadet's training should be his ability to find his way in all kinds of weather and, having found his way, be able to bomb accurately and use his guns in an efficient manner.

There have been two avoidable accidents due to incorrect application of the brakes.

Satisfactory progress has been made in engineering, but the time now spent has been considerably reduced as it is realised that it is more profitable to teach Cadets maintenance of aircraft, the method of running a flight, and give a general knowledge of the workings of a squadron than to spend many hours teaching complicated mechanism of the modern engine, which is more suitable for an Engineer Officer. It has to be borne in mind that with the expansion of the Air Force, Cadets very shortly after they are commissioned are called upon to command a flight, and it is essential that they should have a working knowledge of the difficulties they will meet with very early in their careers in the Air Force.

For the first time Meteorology has been included in the subjects for Scientific Theses, and one Cadet has produced a Thesis worthy of note.

Air Chief Marshal Sir C. Newall presenting the Sword of Honour to Flt. Cadet U/O. P. G. St. G. O'Brian at the Cranwell passing-out inspection.

This term a scheme for interchange of Naval, Army and R.A.F. Officers for lecturing at the various colleges in the three Services has been instituted. Naval and Army Officers have been up to Cranwell to give a series of lectures, and the Chief Ground Instructor from the College has lectured at Woolwich.

During last term the total number of Flight Cadets admitted to hospital was 29. This represents a total of 354 days non-effectiveness as compared with 412 days in the corresponding period last year. The number of admissions due to motor accidents continue to be too high, 78 days being spent in hospital by Flight Cadets as a result of these accidents.

The 33 Flight Cadets who have finished their training at the Royal Air Force College this term are being posted to the following types of squadrons: Fighter Squadrons, 5; Light Bomber Squadrons, 5; Medium Bomber Squadrons, 8; Heavy Bomber Squadrons, 4; Army Co-operation Squadrons, 6; General Reconnaissance Squadrons, 5.

AWARDS

His Majesty the King's Medal, presented to the Flight Cadet who obtains the highest aggregate of marks in all subjects in the final order of merit following the passing-out examinations has been awarded to Flight Cadet Corporal John Derek Middleton.

The Sword of Honour, presented to the best all-round Flight Cadet, has been awarded to Flight Cadet Under Officer Peter Geoffrey St. George O'Brian.

The Air Ministry Prize, awarded to the Flight Cadet obtaining the highest marks in Imperial and War Studies, has been won by Flight Cadet Under Officer Peter Geoffrey St. George O'Brian.

The Air Ministry Prize, awarded to the Flight Cadet obtaining the highest marks in Aeronautical Engineering, has been awarded to Flight Cadet Sergeant John Hugh Lapsley.

The Abdy Gerrard Fellowes Memorial Prize, for the Flight Cadet obtaining the highest marks in Mathematics and Science, has been awarded to Flight Cadet Corporal John Derek Middleton.

The J. A. Chance Memorial Prize, for the Flight Cadet obtaining the highest marks in Service Subjects, has been awarded to Flight Cadet Sergeant John Hugh Lapsley.

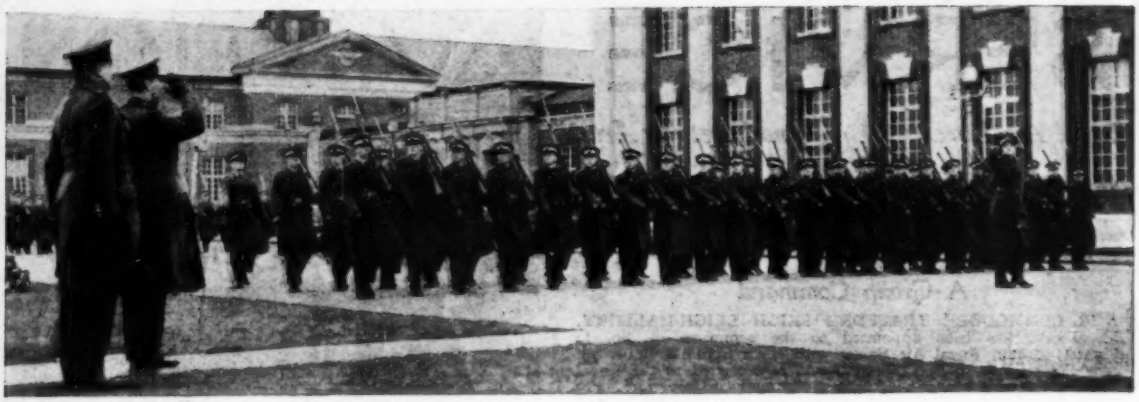
The R. M. Groves Memorial, for the best all-round pilot in the senior term, has been awarded to Flight Cadet Cyril Dampier Palmer.

Mobile Recruiting Office

A NEW form of recruiting publicity is being introduced by the Air Ministry. This takes the form of a mobile recruiting office, which will visit towns and villages not provided with an established recruiting depot, and will enable young men, if they so desire, to obtain first-hand information regarding conditions of entry and service in the Royal Air Force.

It was inspected by the Air Minister and members of the Air Council in the quadrangle of Somerset House, London, last Friday.

Gramophone records will be employed to radiate speeches describ-



The Cranwell Cadets marching past the Chief of the Air Staff.

ing the various vacancies and inviting enquiries from the specially trained staff in attendance regarding conditions of service, and although actual enlistment cannot be effected at this mobile office, arrangements will be made for applicants to be medically examined at the nearest recruiting depot.

Flying Accidents

THE Air Ministry regrets to announce the following accidents:—P/O. Thomas Arthur Bunting lost his life, P/O. Basil Gaston Lancelot Betbeder was dangerously injured, and AP/O. Laurence Herbert McFarlane and A/C.1 Ernest Marrows were slightly injured in an accident which occurred at Honington, on December 16, to an aircraft of No. 102 (Bomber) Squadron, Honington, Bury St. Edmund's, Suffolk. P/O. Betbeder died from his injuries two days later. A further member of the crew, A/C.1 C. A. F. Kettle, was not injured.

Flt. Lt. Harry Hamilton Peck and Sergt. Robert Edmund Patten lost their lives as the result of a collision in the air which occurred at Stansted Park, Hampshire, on December 17, between two aircraft of No. 1 (Fighter) Squadron, Tangmere, Chichester, Sussex.

Royal Air Force Gazette

General Duties Branch

F/O. G. W. Golledge is promoted to the rank of Flight Lieutenant (November 22). The following Flying Officers are granted the acting rank of Flight Lieutenant on the dates stated:—E. M. Withy (October 28); D. P. Frost (November 9). Sqn. Ldr. F. M. R. Stephenson (Cdr., R.N.), ceases to be attached to the R.A.F. with effect from February 11, on return to Naval duty, and is reattached to the R.A.F. as a Squadron Leader with effect from February 26, and with seniority of April 1, 1935. (Substituted for notification in *Gazette* of March 2). Flt. Lt. J. G. Macintyre is placed on the half-pay list, scale B, from March 21 to 28 inclusive.

Medical Branch

Sqn. Ldr. (Quartermaster) F. W. Goodread is placed on the retired list (December 8).

Chaplains Branch

The Rev. E. W. Robotham is granted a short service commission with the relative rank of Squadron Leader, with effect from and with seniority of December 6; the Rev. W. P. Hughes relinquishes the acting rank of Wing Commander (June 26).

Royal Air Force Reserve

Reserve of Air Force Officers

General Duties Branch

Flt. Lt. H. A. Anson (R.A.F., ret.) is granted a commission in that rank in Class C (November 1).

Royal Air Force Volunteer Reserve

Medical Branch

R. Cruikshank, M.D., Ch.B., D.P.H., is granted a commission as Squadron Leader with effect from and with seniority of December 14.

The following are granted commissions as Flight Lieutenants with effect from and with seniority of December 14:—G. A. Jamieson, M.B., B.S., D.O.M.S., D.L.O.; J. T. Linklater, M.R.C.S., L.R.C.P.

Auxiliary Air Force

General Duties Branch

No. 601 (COUNTY OF LONDON) (FIGHTER) SQUADRON.—F/O. R. A. E. Luard is promoted to the rank of Flight Lieutenant (October 31).

Royal Air Force Appointments

General Duties Branch

Group Captains.—R. H. Kershaw, to No. 203 (G.R.) Squadron, Basrah, Iraq; to command, 9.11.37. J. J. Breen, O.B.E., to Headquarters, No. 4 (B.) Group, Linton-upon-Ouse; for duty as Senior Air Staff Officer, 27.11.37. A. H. Jackson, to R.A.F. Station, Thornaby; to command, 1.12.37.

Wing Commanders.—C. E. V. Porter, to Headquarters, R.A.F., Palestine and Transjordan, Jerusalem; for duty as Senior Air Staff Officer, 4.12.37. H. J. Roach, O.B.E., A.F.C., to R.A.F. Station, Seletar, Singapore; for Engineer duties, 4.12.37. R. S. Sorley, O.B.E., D.S.C., D.F.C., to No. 4 Armament Training Camp, West Freugh; to command, 6.12.37. G. E. Livock, D.F.C., A.F.C., to No. 10 Flying Training School, Tern Hill; to command, 30.11.37. V. Buxton, O.B.E., to R.A.F. Station, Hendon; to command, 22.11.37.

Squadron Leaders.—A. D. Rogers, A.F.C., to Headquarters, No. 23 (Training) Group, Grantham; for personnel Staff duties, 15.11.37. A. McKee, to No. 99 (B.) Squadron, Mildenhall; for flying duties, 8.11.37. H. P. G. Leigh, to Headquarters, Fighter Command, Stanmore; for Equipment (Engineer) Staff duties, 22.10.37. J. V. Yonge, to Headquarters, Training Command; for Air Staff (Administrative) duties, 24.11.37. E. J. D. Routh, to Headquarters, Coastal Command, Lee-on-the-Solent; for Administrative duties, 27.11.37. P. MacG. Watt, to No. 49 (B.) Squadron, Worthy Down; to Command, 22.11.37. E. C. Barlow, to Headquarters, Bomber Command, Uxbridge; for Air Staff (Administrative) duties, 22.11.37. G. A. G. Johnston, to No. 11 Flying Training School, Wittering; for flying duties in Advanced Training Squadron, 22.11.37. H. N. Hampton, D.F.C., to School of Naval Co-operation, Ford; for Flying (Catapult) duties, 15.11.37. R. H. Carter, to Headquarters, R.A.F., India, New Delhi; for Air Staff duties, 27.10.37. W. L. Dawson, to No. 216 (B.T.) Squadron, Heliopolis, Egypt; for Flying duties, 15.11.37. W. E. Dipple, to Directorate of Organisation, Air Ministry, vice Wing Cdr. R. S. Sorley, O.B.E., D.S.C., D.F.C., 6.12.37. B. E. Embrey, A.F.C., to No. 20 (A.C.) Squadron, Peshawar, India; to command, 16.11.37.

Flight Lieutenants.—G. L. Best, to R.A.F. Station, Pembroke Dock, 28.11.37. N. D. Crockart, to No. 500 (County of Kent) (B.) Squadron, Manston, 8.11.37. F. A. A. H. Strath, to No. 24 (C.) Squadron, Hendon, 6.11.37. C. Walker, to Headquarters, Fighter Command, Stanmore, 18.11.37. G. E. Peacock, to No. 99 (B.) Squadron, Mildenhall, 18.10.37. P. S. Gomez, to No. 80 (F.) Squadron, Debden, 27.11.37. J. K. Brew, to R.A.F. Station, Dhibban, Iraq, 4.11.37. J. Whitehead, to No. 11 F.T.S., Wittering, 29.11.37. W. R. Sadler, to No. 15 (B.) Squadron, Abingdon, 29.11.37. R. F. Smith, to No. 113 (B.) Squadron, Grantham, 29.11.37. D. Y. Feeny, to No. 233 (G.R.) Squadron, Thornaby, 12.11.37. J. N. Baxter, to R.A.F. Station, Abingdon, 30.11.37. C. B. Hughes, to No. 39 (B.) Squadron, Risalpur, India, 5.11.37. W. S. P. Simonds, to No. 3 (Indian) Wing, Chaklala, India, 10.11.37.

Equipment Branch

Flight Lieutenants.—C. H. W. Boldero, to R.A.F. Station, Lee-on-the-Solent, 1.12.37. J. E. Reynolds and H. A. Wrigley, to R.A.F. Station, Seletar, Singapore, 4.12.37.

Accountant Branch

Squadron Leader.—A. E. Vautier, to R.A.F. Station, Heliopolis, Egypt; for Accountant duties, 15.11.37.

Flight Lieutenant.—D. C. Stone, to Headquarters, R.A.F., Far East, Singapore, 4.12.37

Medical Branch

Squadron Leader.—J. D'I. Rear, to Princess Mary's R.A.F. Hospital, Halton; for duty as Medical Officer, 29.11.37.

Flight Lieutenant.—L. MacK. Crooks, to Home Aircraft Depot, Henlow, 1.12.37.

Chaplains Branch

Revd. W. P. Hughes, to No. 1 R.A.F. Depot, Uxbridge; for duty as Chaplain (C. of E.), 23.11.37. Revd. F. Hobbs, to No. 6 Flying Training School, Netheravon; for duty as Chaplain (C. of E.) on appointment to Short Service Commission, 2.11.37.

Owing to the greatly increased length of these lists as a result of R.A.F. Expansion, ranks are confined to those of Flight Lieutenant and above.

COMMERCIAL AVIATION

ATLANTIC TERMINUS: *Cavalier* **flies over the new land-sea air base at Baltimore. The seaplane jetty is in the lower right-hand corner of the picture with the airport site behind it.**

THE WEEK AT CROYDON

Welcome Reorganisation: North-Eastern on the Job: The Aspirin Express

THE star news of the week is a considerable change in airport organisation. Mr. Jimmy Jeffs, well-known for many years at Croydon as a control tower official, has been appointed, so it is understood, the Inspector-General of Traffic Control for the whole of England. Air Commodore Robertson has now become Airport Superintendent instead of Chief Aerodrome Officer, and Mr. Monk has been appointed Chief Control Officer. These titles are approximate, for the appointments have not been officially announced. It has long been felt that the Chief Airport Officer had more to do than even the broadest shoulders could bear. Since he came to Croydon, Air Comdre. Robertson has worked nobly and made many outstanding improvements, but the organisation and administration of an airport such as Croydon is more than a whole-time job in itself, and traffic control is obviously another whole-time job. The choice of Mr. Jeffs to control and co-ordinate traffic will be popular among pilots and operators, for he is one of those who has really done the pioneer work in the control tower, and he has seen air traffic grow from a matter of an occasional back-and-forth machine, without wireless, to a matter of machine after machine coming in or going out in all sorts of weather conditions. He may be described as the right man in the right place, and it is a minor miracle that precedence has so far been thrust aside that no Brigadier-General has been appointed.

The expansion is an inevitable and desirable one, and something similar has already taken place in Holland—at Schiphol aerodrome, where, I understand, the traffic controller has been appointed to work side by side with the airport officer, or harbourmaster, as that official is more logically named in Holland.

Cdr. Smirnoff, of the K.L.M., one of the few commercial pilots to have two million miles' flying to his credit, is to broadcast at the B.B.C. shortly. His career is an interesting one, for he was a Czarist officer before the war, and was decorated both in Russia and France for his war services

Mr. Farey Jones, well-known as the managing director and organiser of British Continental Airways, has now joined the board of directors of North-Eastern Airways, the chairman of which is Lord Grimthorpe. North-Eastern Airways is a firm about which we hear very little; nevertheless, its services are operated with great regularity between Croydon and the North of England and Scotland. Capt. Boitel-Gill, of North-Eastern Airways, did a rush special job of extreme urgency on Wednesday of last week, when weather conditions were extremely bad. He flew a D.H. Rapide to Paris with a well-known scientist who was anxious to keep an appointment, and who, thanks to Capt. Boite-Gill, was able to make it.

Business Transport

The flying drug-store, facetiously known as the "aspirin express," arrived here on a demonstration flight one day last week. The machine belongs to the big German firm of chemists, Bayer. It is fitted with compartments along each side of the fuselage with a central gangway complete with brass hand-rails. Special webbing slings and other devices for protecting the cargo of drugs are employed. At the back there is passenger accommodation for four people, presumably medical or scientific personnel.

The idea is to come here once a month with consignments of very special drugs and, above all, to be able to rush to this country urgently needed drugs not normally available. The idea is not a new one, for many lives have been saved by air transport, either by conveyance of medicines or medical personnel from one place to another; but this is the first machine which has been specifically fitted-up for the job.

AN I.N.A. YEAR

A NUMBER of interesting points were raised by Mr. Grant Govan, the chairman of Indian National Airways, when he made his speech at the fourth annual meeting of the company in New Delhi last month.

In the first place, and largely, it appears, through the sacrifices made by the directors and agents, who have foregone all the fees due to them, the company's accounts show a modest three-figure balance on the right side—which is certainly unusual for an unsubsidised air transport concern. During the year, too, Mr. D. D. Sharma was presented with the Willingdon Trophy for the most meritorious flying performance made by an Indian national in any part of the world.

At present the company operates a twice weekly mail service between Lahore and Karachi, runs charter services from Delhi and Lahore, and carries out a certain amount of maintenance work. When the Empire air mail scheme is completely in action the mail service will be run five times weekly. Various extensions are being considered, these including services from Lahore to the North-West frontier, and possibly into Kashmir, to Delhi, and to Kalka during the summer months. The traffic staff of I.N.A. will look after the new flying boat bases at Udaipur and Gwalior in addition to those bases serving the same district as the trunk-route aerodromes which are already staffed by the company. Mr. Grant Govan also spoke of possible activities in Bengal and Assam, to feed those places which would not be touched by the Empire services. Such activities must, however, await the change of disposition on the part of the Central and Provincial Governments.

Commercial Aviation

TRAINING FOR TO-MORROW

The Progress of the Imperial Airways Pilots' School : First-class Navigators' Licences for All Empire Captains

The navigation room at the Imperial Airways school—with pupils learning the whys, hows and wherefores of sextants.

FOR some considerable time—since February, 1935—Imperial Airways have run their own school at Croydon so that the already "B" licensed newcomers may gather to themselves the necessary specialised and general knowledge demanded of the present-day transport pilot. In fact, Imperials were, as might be expected, the first operating company in this country to start a comprehensive system of training for their flying staff. This, of course, does not include basic flying training, but the curriculum involves advanced air work, for which Avro 652 and D.H.86 machines are used.

The school is in charge of Sqn. Ldr. G. E. Godsave—ex-R.N., R.N.A.S. and R.A.F.—who, it may be remembered, took a considerable part in the navigational development work preparatory to this year's Atlantic experiments. Capt. F. C. Allen is in charge of the practical flying side.

All the probationary pilots, between intervals of service as first officers on the regular runs, go through courses for G.E.'s licences, for P.M.G. W/T operators' licences and, more important still, for Second-Class Navigators' licences—which every pilot of the company must now hold. The W/T and navigation classes are held in the Stafford Road premises, while engineering experience is gained in the shops at the aerodrome and in lecture-rooms there.

The engineering classrooms are at the airport. In this photograph the centre of interest is an automatic supercharger control layout.

This educational system is now by way of being ancient history, but the whole scheme has become much more important now that the Empire Mail scheme is being put into effect and that regular long-distance oceanic services can be expected to be in operation within a year or two. Apart from the fact that a First-Class Navigator's licence must be held by any transport pilot who is flying over more than 600 miles of sea or of uninhabited country, Imperial Airways intend eventually that all their captains on the Empire routes shall possess this qualification. In years to come, when the present first officers are ready for it, the work involved will be less of a mental hardship, since these first officers are already developing an examination habit which is obviously half the battle. All the greater praise for those senior captains of the old school who have obtained their First Class Certificates. Actually, fourteen Imperial pilots are already qualified.

While the newcomers spend a very large proportion of their initial time in lecture-rooms, what may be called the post-graduate or advanced courses for the senior pilots must necessarily be taken during and between regular service runs. Much of the navigational work for the First-Class Certificate can be done as practice on the routes and a "cramming" period of eight weeks before the examination is all that is necessary. Maintenance experience is obtained at Hythe and elsewhere in between voyages.

Needless to say, there is, apart from the *ab initio* and advanced courses, the flying-boat conversion course provided by Air Service Training, at Hamble, where nearly a hundred landplane pilots have so far been passed out.

Thus the practical side of air transport is being put on a sounder basis for present and future operations. There must be nothing happy-go-lucky about transport flying.

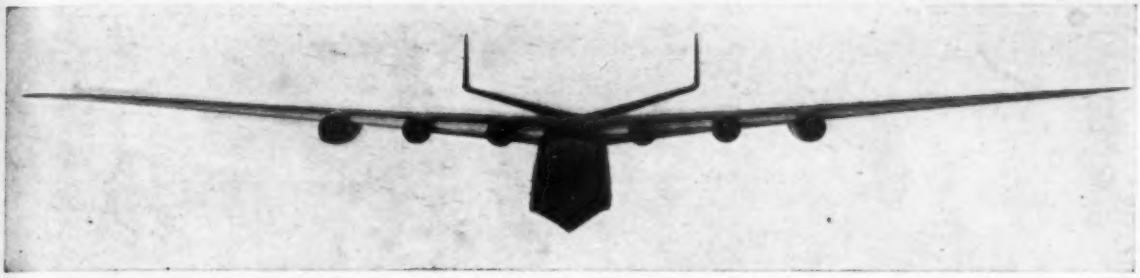
A LARGER GATWICK

A BIG extension scheme may presently be under way at Gatwick airport and the plans have already been submitted to the Air Ministry.

At present the area is bounded on the south side by the Lowfield Heath Road which runs behind the B.A. hangar, and on the east by the railway line. The Surrey C.C. have now planned the construction of a new road and the land between this and the old road is for sale. If this is taken in by Gatwick the N.E.-S.W. run will be increased to nearly 1,600 yards. Further land is for sale on the west side, so that it will be possible to improve E.-W. run from 1,100 yards to nearly 1,400 yards, and a similar state of affairs exists on the north side where the boundary would adjoin the racecourse.

Eventually it may be supposed that the respective runs will be 2,334 yards (for the blind approach N.W.-S.E. line), 1,834 yards (with two alternative N.-S. runways), 1,600 yards (N.E.-S.W.) and 1,383 yards (E.-W.).

The matter is obviously one of some urgency since if it is not taken up the land may go to the builders just as it has in a number of other cases and London will have lost a useful main or alternative airport site. If the plan goes through, Airports, Ltd., will lay down concrete runways in order to deal thoroughly with modern requirements and to remove the possibility of wet weather difficulties. Incidentally, since the new drainage scheme has been completed there has been no trouble with the surface of Gatwick.



A FRENCH ATLANTIC HOPE : The Latécoère 631 flying boat designed for service over the South and North Atlantic. The top speeds available on the two routes will be, respectively, 264 m.p.h. and 217 m.p.h. The six engines will be Gnome Rhones and dimensions are : span 187 ft., length 141 ft., height 33 ft. Accommodation is made for 20 passengers, a crew of eight, and 3 tons of freight. Passengers will have private cabins and amenities will include a shower bath and a promenade deck.

New Director for British Airways

THE Secretary of State for Air has appointed the Rt. Hon. Viscount Monsell, G.B.E., as Government director on the board of British Airways.

Langstone Again

THE Air Ministry has advised the Portsmouth Corporation that they are ready to re-open negotiations with a tidal scheme for Langstone Harbour and the Council has agreed to reconsider this question and any new financial proposals which might be put forward.

It will be remembered that the Portsmouth City Council recently decided not to promote a Bill which would have given it power to carry out a barrage scheme for the Harbour.

Through to Ceylon

ON December 18 Tata's southbound services were due to be extended, via Trichinopoly, from Madras to Colombo (Ceylon). The service will operate for the present only twice a week in each direction, but from January 18 the frequency will be increased to four times and later to five times a week when the air mail scheme comes into operation.

Far Eastern Modification

THE Imperial Airways' service to Hong Kong, which was previously operated by way of Penang, will in future run from Bangkok *via* Udorn, Hanoi and Fort Bayard.

This new route is more than 300 miles shorter than that previously used and it will now be possible to reach Hong Kong by air in eight and a half days instead of the nine and a half days which were previously taken on the journey. The service is run each way once a week.

Croydon Changes

TWO new posts have been created for the management of Croydon Airport. Air Commodore Robertson, who was previously Chief Aerodrome Officer, has become Airport Superintendent, while Mr. J. Jeffs is to be known as Inspector of Air Traffic Control.

Mr. Jeffs will, therefore, be virtually responsible for air traffic organisation over the entire country and this new plan was largely foreshadowed in an article on traffic control which appeared in *Flight* of January 21 this year.

For Toronto, Too

A NEW land-sea airport is taking shape at Toronto. It is being built on Toronto Bay, next door to the business district. The waterfront at this point is sheltered from Lake Ontario by a series of islands and the western end of this island semi-circle is being made into a combined land and seaplane airport.

In addition to the waterfront airport, a second airport is being built seventeen miles north-west of the city, and this is to be the second largest in Canada.

Less Noise

LAST week the Under-Secretary of State for Air received a deputation from the Anti-Noise League. The deputation particularly pressed the need for total abolition of all air advertising and suggested that machines used for instructional or joy-riding purposes should be fitted with silencers.

Lt. Col. Muirhead rightly pointed out that in all future machines airscrew noise was likely to be greater than exhaust noise and said that considerable attention had been paid to the enforcement of safety regulations concerning air advertising.

FAR EAST TERMINUS : The Imperial Airways D.H. 86 *Dorado* at Hong Kong after two years' service on the Penang-Hong Kong service. From now on this service will cut across from Bangkok, thus shortening the flying distance. The Union Jacks painted on the fin and the wings are an efficient commentary on the present Far East situation.

The Handley Page party, at which the guest of honour was Lt. Col. Muirhead.

OFFICIAL APPROVAL

Under-Secretary of State for Air Attends Handley Page Staff Dinner

POSSIBLY for the first time in British aircraft history, an Under-Secretary of State for Air has attended a contractor's staff dinner. The occasion was the Handley Page dinner at the Wharncliffe Rooms, London, last Thursday, and, in spite of important engagements at the House, Lt. Col. A. J. Muirhead, M.C., M.P., found time not only to attend but to make a speech. One may take it that this was Lt. Col. Muirhead's way of showing his appreciation of the fact that Handley Page, Ltd., are some three months ahead of schedule in delivering the Harrow bombers, the last of which went to Radlett on Wednesday, December 15.

Lt. Col. Muirhead jestingly pointed out that Leonard Henry, with his references to the old school tie, had reminded him of the difficulty of saying something nice about the firm. They had been unwise enough to name their bomber the Harrow, and, as an old Etonian, it was difficult for him to applaud a Harrow success. He did not see why a firm should not name an aeroplane after the last letter of its name instead of after the first; if that were done, they would get a Handley Page Eton.

Concerning the firm's next type, the Hampden, he found it easier to be pleased, for John Hampden was said to have passed through his (Lt. Col. Muirhead's) village on his last journey, and to have asked for a drink of water. Hampden was one of our greatest defenders of liberty, and looked at in the right way, they could so regard the Handley Page Hampden bomber, which was to follow the Harrow in production. He recognised that what made the Handley Page works turn out good stuff ahead of time was the excellent team spirit. In making an appeal to them to make a fresh effort in connection with the Hampden, the Air Ministry had no doubt whatever about the response.

Mr. S. R. Worley, chairman of Handley Page, Ltd., thanked the staff for the good work done during the past year, and recalled that the works had recently been honoured by a visit by His Majesty the King. He concluded by expressing the wish that 1938 might be the happiest year they had ever experienced.

Mr. F. S. Gaylor explained that for many years he had given legal advice to the Handley Page company. When he said *given* he was using a figure of speech, even if the figure was not as large as he could wish. However, it had enabled him to keep the wolf from the door and the tax collector from the old homestead. He regarded the Handley Page company as benefactors of the human race by reason of its contribution to safer flying—the H.P. slot.

Mr. F. Handley Page humorously pointed out that although they were very grateful to the Under-Secretary of State for Air for attending their dinner, they could legitimately assume that he would not have done so if the Handley Page firm had not done a good job of work. He pointed out a thing which was probably not known to many of those present, namely, that their works manager, Mr. Hamilton, was once upon a time a footballer. That meant that he had speed, and speed was a good thing to have in the works.

A Pension Scheme

Explaining that the company had now reached a size and standing when a pension scheme ought to be in operation, Mr. Handley Page said that Mr. Easy (the secretary of the firm) was at present negotiating with an insurance company. He hoped that the scheme would be put before the staff early in the new year.

Turning to the future, Mr. Handley Page recalled that when they started on the Harrow, Mr. Hamilton had said that it was much more difficult to make than the Heyford. Yet they had managed to complete the contract well ahead of schedule. When, therefore, Mr. Hamilton now said that the Hampden was much more difficult to make than the Harrow, Mr. Handley Page thought they need not worry overmuch, and he confidently looked forward to the Hampden contract being finished six months ahead of schedule. He concluded by asking them to resolve to surprise the Air Ministry even more in 1938 than they had in 1937.

R.Ae.S. AWARDS

ANNUAL awards made by the Council of the Royal Aeronautical Society in recognition of outstanding technical contributions are announced as follows :—

SIMMS GOLD MEDAL.—Dr. N. A. de Bruyne, for his paper on "Plastic Materials for Aircraft Construction." (The Simms Gold Medal is awarded annually for the best paper read in any year before the Society on any science allied to aeronautics.)

TAYLOR GOLD MEDAL.—Mr. George Mead, A.F.R.Ae.S., for his paper on "Power Plant Trends." (The Taylor Gold Medal is awarded annually, at the discretion of the Council, for the most valuable paper submitted or read during the previous session.)

WAKEFIELD GOLD MEDAL.—Dr. G. V. Lachman, F.R.Ae.S., for his paper on "Aerodynamic and Structural Features of Tapered Wings." (The Wakefield Gold Medal is awarded annually to the designer of any invention or apparatus tending towards safety in flying, and is open both to members of the Society and to non-members.)

EDWARD BUSK MEMORIAL PRIZE is offered annually for the best paper received by the Society on some subject of a technical nature in connection with aeroplanes or seaplanes. This year two papers were considered of equal merit, and the prize has been divided between Major B. C. Carter, M.I.Mech.E., A.R.C.Sc., D.I.C., F.R.Ae.S., for his paper on "Airscrew Blade Vibration"; and Mr. A. G. Pugsley, B.Sc., A.M.I.Struct.E., A.F.R.Ae.S., for his paper on "Control Surface and Wing Stability Problems."

PILCHER MEMORIAL PRIZE is offered annually for the best paper, by a student, on heavier-than-air craft or any analogous subjects. Two papers were considered of equal merit, and the prize has been awarded to Mr. A. J. Hanson, B.Sc., for his paper on "Critical Speeds of Monoplanes"; and to Mr. C. O. Vernon for his paper on "Aircraft Performance Estimation."